ANNUAL REPORT

OF

THE TRUSTEES

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY,

AT HARVARD COLLEGE, IN CAMBRIDGE:

TOGETHER WITH

THE REPORT OF THE DIRECTOR

FOR

1870.

BOSTON:
WRIGHT & POTTER, STATE PRINTERS,
79 Milk Street (corner of Federal).
1871.

SENATE..... .....No. 327.

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Commonwealth of Massachusetts.

BOSTON, May 23, 1871.

To the Honorable the Senate and House of Representatives.

The Trustees of the Museum of Comparative Zoölogy respectfully present the Annual Report of the Director for the past year, marked [A].

The paper marked [B] contains a list of the trustees, officers and committees for 1871.

During the past year the third $25,000 of the conditional subscription has been raised, and the corresponding $25,000 has been received from the State.

For the Trustees,

MARTIN BRIMMER, *Secretary.*

[A.]

REPORT OF THE DIRECTOR

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY,

FOR THE YEAR 1870.

Although, in consequence of protracted illness, I have been unable for most of the time to attend to my duties as Director since I presented my last Report, the Museum has nevertheless progressed with regularity in its onward course. This is chiefly owing to the fact that the organization of our institution is steadily acquiring more stability through experience. We have now an increased number of assistants, are better able to appreciate our own wants and resources, and enjoy an enlarged intercourse with other similar establishments. Our prosperity, and especially the system with which the business details of the establishment have been conducted, are in no small degree due to the disinterested devotion of Mr. T. G. Cary, who for nearly two years has attended day by day to the management of our ever-increasing affairs. I rejoice the more over this state of things, as it shows that with every year the progress of the Museum is less dependent upon my personal attendance, and therefore likely to go on as well as before, when I can no longer take care of it.

One of the characteristic features of the organization of the Museum is that all its officers are expected to work seven hours a day, purely for the good of the institution; no outside work,

even of a scientific character, being admitted during that time, as the Museum is designed to advance science generally, and in no way to afford either its Director or the curators of the different departments an opportunity of benefiting themselves. It is a great pleasure for me as Director to be able to say that all the officers of the Museum are now coöperating with me in that spirit. It is, no doubt, to this devotion to the institution on the part of so many able workers, that the Museum owes its unparalleled and rapid growth. Moreover, the services of Messrs. Theodore Lyman, Alex. Agassiz and T. G. Cary are given gratuitously.

The intended arrangement of the collection is not yet fully made apparent, owing to want of room. It may, however, be said that in preparing specimens for exhibition, the intention of keeping the faunal collections distinct from the general systematic collection is constantly held in view, and that synoptical collections are made besides, for the special use of students, not to speak of the collections intended to illustrate the structure, development and successive appearance upon earth of the different classes of the animal kingdom, which from their very nature require to be put up separately.

The zoölogical collection intended for the special use of students, begun in 1861, has been extended, and in some parts completed and labelled. A new gallery destined for a special palæontological collection, also for the exclusive use of students, has been cleared for this purpose. Elementary collections of typical specimens are also preparing for our normal schools; but I find it most difficult to make proper selections.

The accessions to the Museum during the past year have been very great and of surpassing importance. Foremost stands Deyrolle's collection of Curculionidæ, presented by Mrs. A. Hemenway; next the collection of Galls of Baron d'Osten-Sacken, presented by him; then the magnificent collection of Fossil Plants of Mr. Lesquereux, especially remarkable for the exquisite selection of the specimens it contains, and that of Insects of Texas, made by Mr. J. Boll, both of which have been bought by the Museum.

The fact that Dr. Hagen has brought to this country his unparalleled collection of Neuroptera, which is now deposited in the Museum, is calculated to have the most beneficial influence

upon the progress of that branch of entomology in this country. Besides this, Dr. Hagen has secured for the Museum a number of special collections during his late visit to Europe. Mr. Alex. Agassiz has also made many valuable acquisitions for the Museum during his journey in the old country. Among the additions to our means of study, I ought especially to mention the large series of scientific periodicals presented to the Museum by the University of Bale, and the many works and pamphlets received in exchange for our own publications.

The special reports of the curators of the different departments give a full account of all the donations received by the Museum during the past year. There are, however, some which require a special mention in this place: from Mr. G. V. Fox, late under-secretary of the navy, sundry specimens from Japan and the East Indies; from Mr. Benjamin O. Peirce, a Cape Ant-Eater; from Professor Worthen, fossils of Illinois; from the Massachusetts Agricultural College in Amherst, from Mr. Haskell in Deerfield, from Colonel Theodore Lyman in Boston, and from Mr. W. W. Chenery in Belmont, valuable specimens of domesticated animals.

On the whole, the work done in the Museum during the past year has been a continuation of that of the preceding year, with this essential difference, however, that the accession of Dr. Steindachner, Count Pourtales and Messrs. Léo Lesquereux and E. Bicknell to our corps of officers, has made it possible to take in hand parts of the collections which had been much neglected of late. Thus Dr. Steindachner has begun the identification and final arrangement of the Fishes; Mr. Pourtales has carried forward that of the Corals; Mr. Lesquereux has put in order the whole collection of Fossil Plants, and Mr. Bicknell has resumed the preparation of microscopic sections, entirely neglected since the death of Mr. Glen. The large collection of palms and other tropical plants intended to illustrate the vegetation of past geological ages is still packed up. Mr. Lyman has determined and described all the Ophiurans obtained by the Coast Survey's deep-sea dredgings. Mr. Alex. Agassiz has done the same for the Echinoids; Dr. Wm. Stimpson for the Brachyuran Crustacea, and Mr. Pourtales for the Corals. Meanwhile the monograph of the North American Astacidæ, by Dr. Hagen, and the papers of Mr. J. A. Allen upon the Eared

Seals and the Mammalia and Winter Birds of Florida have been printed and distributed. The paper of Mr. Allen on the Seals is accompanied with remarks by Mr. Charles Bryant and with plates neatly drawn by Mr. Paul Roetter, who has, moreover, since prepared the plates for the paper on Corals, by Mr. Pourtales. Mr. Konopicky is now engaged upon the plates for the paper of Mr. Cabot on the larvæ of Gomphidæ.

In addition to this kind of work several officers of the Museum have given lectures or special instruction to the undergraduates as well as to the special students of the Scientific School and in the university course. Since my sickness Professor Shaler has taken charge of the whole course of instruction given to the undergraduates, while I have only retained the supervision of the instruction of the scientific students. Prof. Perry has delivered a special course upon the geology of Massachusetts in the university course.

The general policy pursued during the whole year, in consequence of our limited means, has been to foster such operations and do such work as requires knowledge and personal application, while requiring only small outlays of money; but the time has come when it will be indispensable for the further increase of the Museum to make extensive purchases of objects which money only can procure.

In anticipation of the final arrangement of the collections in that part of our building which is now in course of erection, regular conferences have been held among all the officers of the Museum, in which we have carefully discussed the questions which may have an influence upon our future progress. Among the topics which have especially engaged our attention, I may mention: *Coöperation* with other institutions in this country, with a view of avoiding useless or costly competition; *nomenclature*, with a view of determining the best mode of labelling the specimens; *structural collections*, as contrasted with zoölogical series; *the arrangement of the library*, with the special intention of facilitating the work of identification by the curators of the different departments, when it was agreed that all the special treatises should be kept in the rooms in which special work is done, and only general works remain together in the library. It is hoped by thus bringing books and specimens

together within reach of the curators, that everybody's task will be rendered less laborious.

With this I present also the special reports of the curators of the different departments of the Museum, as parts of my own.

All of which is respectfully submitted by

Ls. AGASSIZ.

Report on the Mammals, by J. A. ALLEN.

Little has been done in this department during the past year beyond the partial revision of the osteological collection, by Dr. G. A. Maack, and the work necessary to insure the safety of the alcoholic specimens and the skins, and the cataloguing of the recent additions. A small portion of the alcoholic collection, however, has been catalogued and systematically arranged; but on the whole the collections remain in nearly the condition reported last year, a small part of the alcoholic collection being still uncatalogued. This collection, as well as that of the skins, continues in good condition; but the increasing danger to the skins from destructive insects, resulting from their hitherto necessary storage in imperfectly closed cases, has shown the necessity of a more secure method of preservation. This danger is now happily to be soon obviated, as these preparations are soon to be transferred to hermetically closing tin cans, which have already been provided.

The additions during the past year number 242 specimens, representing about 60 species. About one-fourth of these were obtained through donations, and one-fourth by exchanges, the rest having been acquired by purchase. Among the noteworthy acquisitions are a European skeleton of *Alces malchis;* skeletons of a thoroughbred Jersey bull and Jersey cow,—the first presented by the Massachusetts Agricultural College and the last by Mr. H. C. Haskell of Deerfield; and a collection of Florida specimens, numbering 56 skins and 30 skulls, representing about 20 species, purchased of Mr. C. J. Maynard. The osteological series designed to illustrate the different breeds of domesticated animals has also been further increased by the donation of the skeleton of a Black Hawk mare by Mr. Theo-

dore Lyman, and the skeleton of the celebrated brood mare "Meg Merrilies," by Mr. W. W. Chenery of Belmont. Among the other important additions are a series of nine embryos of different ages of the *Globiocephalus melas*, and five skulls of the same species obtained for the Museum by Mr. James H. Blake.

The following is a list of the additions to this department during the year 1870,—

By Donation.

Agassiz, Prof. Louis. 6 specimens, 4 species, in alcohol, from Deerfield, Mass., and Bethlehem, N. H.

Allen, J. A. 1 skin of *Putorius ermineus*, and several skulls of other species, from Springfield, Mass.

Blake, James H. 9 embryos and 5 skulls of *Globiocephalus melas*, from Wellfleet, Mass.; 1 skelcton of *Delphinus erebennus*, from Provincetown, and a skeleton of an African monkey.

Chenery, Winthrop W., Belmont, Mass. The celebrated brood mare "Meg Merrilies."

Hagen, Dr. H. A. 5 specimens, 2 species, of *Arvicolæ*, from near Koenigsberg, Prussia.

Haskell, H. C., Deerfield, Mass. The Jersey cow "Emma" (Am. Herd Book, No. 322).

Lyman, Col. Theodore. 1 albino woodchuck, and the skeleton of a Blackhawk mare, his war-horse during Gen. Meade's campaign.

Massachusetts Agricultural College, through Col. W. S. Clark. Skeleton of the thoroughbred Jersey bull "Essex."

Munroe, J. S., Lexington, Mass. Several young pigs.

By Exchange.

Australian Museum, Gerard Krefft, Esq., Director. 5 specimens, 5 species, skins, from New South Wales.

Cutting, Dr. H. A. 20 specimens, 5 species, fresh, from Lunen berg, Vt.

Montes-de-Oca, Rafael. 8 mounted specimens, 8 species, from the vicinity of Jalapa, Mexico.

Müller, Prof. Augustus, Koenigsberg, Prussia. Skeleton of a European specimen of *Alces malchis.*

Parker, Prof. H. W. 5 specimens, 4 species, skins (including two specimens of *Mephitis bicolor*), from the vicinity of Grinnell, Iowa.

By Purchase.

48 specimens, 18 species, skins from various parts of New England; skeletons of *Alces malchis*, *Ursus arctos* and *Lupus americanus*, from Northern Maine; 56 specimens, 18 species, skins, from Florida. Also 60 skulls, 20 species, from New England and Florida.

Report on the Birds, by J. A. Allen.

In consequence of other duties, the arrangement of the Birds has not advanced during the past year so much as in some previous years, or as much as was anticipated when last year's report was prepared. Little has been done on the alcoholic collection further than to look after its safety. Some three thousand skins, recently added, have been entered on the general catalogue, while the provisional systematic arrangement of the whole collection of skins has been completed, and systematic catalogues of all the alcoholic North American birds have been prepared; as also of a part of the North American skins. Much more time than is usual has been required to check the inroads of destructive insects, to the attacks of which the skins of the birds, as well as those of the mammals, have been thus far exceedingly susceptible. Only a very small part of the collection, however, has been infected, and no serious loss has resulted. The collection is now apparently entirely free from these pests, and it is confidently expected that by transferring the collection of skins to the tightly-closing tin cases which have been ordered for them, and a part of which have already arrived at the Museum, no further trouble from this source will be experienced.

The additions made during the past year embrace 938 skins and alcoholic specimens, representing about 450 species, and about 120 eggs. The most important invoices consist of a lot of 132 specimens of beautifully prepared skins, representing 82 species, from the vicinity of Jalapa, Mexico, purchased from Sr. Rafael Montes-de-Oca; another of 72 specimens of European birds, and another of 65 specimens from New South Wales, acquired by exchange, the first from Dr. H. Dohrn of Stettin, Prussia, and the other from the Australian Museum. A collection of 470 specimens, chiefly mounted, received from the Harvard Natural

History Society, has also added many valuable specimens to the collection.

The following schedule indicates the sources from which specimens have been received the past year, and the number of specimens from each :—

By Donation.

AGASSIZ, Prof. LOUIS. 1 *Accipiter fuscus*, from Deerfield, Mass.

ALLEN, IRVING. 8 specimens of *Cyanura cristata*, from Springfield, Mass.

ALLEN, J. A. 10 specimens, 4 species, and 30 eggs and young birds, 3 species, in alcohol, from Orleans, Mass.; sterna and other bones of 18 specimens of *Ectopistes migratoria;* several complete skeletons of other species, and 6 skins.

ATWOOD, DANIEL W. 23 specimens, fresh, 5 species, from Provincetown, Mass.

BLAKE, JAMES H. 8 specimens, 5 species, in alcohol, from Provincetown, Mass.

BLISS, RICHARD, Jr. 3 specimens, 2 species, skins, from Cambridge, Mass.

COTTING, Dr. B. E. 1 *Chræcocephalus Bonapartei*, from the coast of Maine.

HARVARD NATURAL HISTORY SOCIETY. 470 specimens, 250 species, chiefly mounted specimens, from various localities.

HUGHES, D. DARWIN, Esq. 9 specimens, 6 species, skins; 42 dry eggs, 8 species; from Calhoun Co., Michigan.

MANN, BENJ. P. 36 specimens, 26 species, skins, from Lady Island, S. C.

THAXTER, ROLAND. 1 egg of *Aramus giganteus*, from Florida.

WEBBER, Mrs. M. 8 specimens, 4 species, skins, from New Orleans, La.

By Exchange.

AUSTRALIAN MUSEUM, GERARD KREFFT, Esq., Director. 15 specimens, 12 species, in alcohol; 50 specimens, 40 species, skins, from New South Wales.

CUTTING, Dr. H. A. 11 specimens, 7 species, fresh, from Lunenberg, Vt.

DOHRN, Dr. H., Stettin, Prussia. 72 specimens, 52 species, skins and mounted specimens of European species.

HAMLIN, Prof. CHAS. E. 8 specimens, 2 species, skins, from Waterville, Me.

Parker, Prof. H. W. 61 specimens, 38 species, skins, from Grinnell and vicinity, Iowa.

Smithsonian Institution. 26 specimens, 14 species, dry eggs, from various localities.

By Purchase.

Two skins of hawks, from Hudson, Mass.; 132 specimens skins, 83 species, from the vicinity of Jalapa, Mexico; 70 specimens, 30 species, from Dallas, Texas.

Report on the Fishes, by Dr. Franz Steindachner.

I arrived in Cambridge, May 11, 1870, having come to this country in order to assist Prof. Agassiz for a few years in the arrangement and determination of the magnificent collection of Fishes in the Museum of Comparative Zoölogy. As the disposition of these specimens should agree in every respect with the plan adopted by Prof. Agassiz for all the collections belonging to the Museum, I had to put up separately: (1) Faunal collections, to illustrate the ichthyological character of the different zoölogical provinces; (2) a systematic collection exhibiting the various degrees and different kinds of affinities of these animals; and (3) a collection representing the types of the different families and genera for the special use of students.

The collection of the fishes of Brazil secured during the Thayer Expedition is without any exaggeration the richest and most complete in the world, and for that reason it is of the highest importance that they be well preserved and correctly determined.

I began my investigations with the marine fishes of Brazil, partly and provisionally arranged in glass jars and scattered over the different stories of the Museum. Many were still in barrels and all undetermined. The arrangement of so large a number of fishes according to their systematical position, their locality and their collectors, was a laborious task and required much time and care in its details, particularly as all the jars had to be cleaned and filled with new alcohol. I have now the satisfaction of seeing that all marine fishes of Brazil, except the Murænidæ and Chondrostei, are carefully determined and that

3,600 specimens of them, belonging to 170 different species and assorted in 610 glass jars, are catalogued, labelled and placed by myself in the exhibition room; the rest may be labelled in the course of two or three months.

Among the new species of marine fishes of Brazil I found two of the genus Thalassophryne, two of the genus Uranoscopus, two of the family of Sciænidæ (Pachypops and Micropogon), one of the genus Centropomus, etc., etc. Among the species already described are fine and beautiful specimens of Gobioides Broussonetii C. Val., from Rio Para; Corniger spinosus Agass., from Rio Janeiro; Pachiurus Lundii Reinh, from Rio das Velhas; Belone tæniata Gthr, from Gurupa, etc.; Borridia grossidens from Rio de Janeiro. In regard to the geographical distribution of the fishes, Prof. Agassiz's Brazilian collection is without doubt the most important in the history of Ichthyology.

Besides the above I have completely examined Mr. Garett's most valuable collections from the Society, Kingsmill and Sandwich Islands. They contain more than 250 species, in nearly 2,400 specimens, and are in the best state of preservation. I hope to be able to arrange and catalogue this collection also during the next year, and to publish a scientific catalogue with descriptions of the new species. Among the fishes of the Sandwich Islands I will only mention a beautiful specimen of Pogonoperca ocellata Gthr.

Finally I have begun the scientific revision and determination of the Holocentridæ and Percidæ for the systematic collection.—Nothing has been done during the present year to increase the collection of Reptiles, which is, however, in a satisfactory state of preservation.

Report on Conchology, by JOHN G. ANTHONY.

In my last report made December 31st, 1869, it was promised that during the current year some progress should be made in mounting, arranging and identifying our Marine Shells, and that the present statement would show a marked improvement in that respect.

Since then 2,417 tablets have been added, mounted with

5,376 specimens, making the entire number now on exhibition 28,667 tablets, and 73,125 specimens. This falls somewhat short of our expectations, but it was all that could be done by one assistant only, who was able to devote to it but a portion of her time, and that during only about three-fourths of the year.

My own time, meanwhile, has been taken up with other duties, among which may be mentioned our exchanges, with the correspondence necessary to carry them on successfully, the identification and labelling of species, and the entire re-arrangement of all our collection of Mollusks. At the commencement of the year it was under the old Lamarckian classification and arrangement, which has since been changed to the newer method of H. and A. Adams. This has been an important step forward in the right direction, although it cannot be considered as by any means a finality, since many errors and deficiencies can readily be perceived, which time and patience will enable us to amend; while with all its short-comings, this is nevertheless a real improvement. While making these radical changes, the plan of cataloguing each species under its ascertained genus has been steadily pursued, and we are thus progressing towards a complete catalogue of all our Mollusks, a consummation most devoutly to be wished, and which now bids fair soon to be realized.

Over 6,500 species of shells have been arranged and registered within the past six months, being nearly two-thirds of our whole collection. The main work in this line to be done includes some very large and important Lamarckian genera, such as the Helices, the Unios, and other Naiades, and the Melaniadæ, all of which have been registered under the old genera. The progress thus far made is truly gratifying in its main features, although revealing many great deficiencies which it is to be hoped may, before the next report, be supplied. It may be remarked, also, that much remains to be done in the way of identification, our means to that end being still inadequate; but what could be done has been done, and no species has been registered without being carefully and thoroughly examined. When the Museum funds will admit of a little outlay for a few very essential books on conchology, we may expect a better knowledge of all our species, and a more satisfactory statement on our Museum catalogue.

Besides the important addition of 2,417 mounted tablets to our previous number, I have, in the process of re-arrangement, found it necessary also to remount a very large number of the species. This has been owing to the unsatisfactory nature of the cement first used for the purpose, the very dry atmosphere of our exhibition rooms operating unfavorably upon all the cements known, at the time when we commenced this mode of exhibiting shells. Much time and labor has been bestowed upon this problem of the best cement for the purpose, and I am happy to be able to say that I have so far succeeded in removing all difficulties, that we may reasonably hope to be spared hereafter the time and labor of remounting, our present cement seeming to be all that we could desire or expect.

During the earlier portion of the year much of my time and attention was given to our exchanges, which have continued to increase in value and importance as a longer experience and a better knowledge of the condition and wants of our collection has enabled me to arrange with our numerous correspondents for such species only as would supply deficiencies, and thus add directly to our resources without, at the same time, burdening ourselves with undesirable or unnecessary duplicates.

Most of the specimens received during the year have been of the most desirable and useful kind, and hence our collection has increased both in value and importance in a much greater ratio than ever before. By these exchanges we have received from 27 contributors 40 packages of shells, containing 2,117 species and 15,853 specimens. These contributions have been so uniformly good and so entirely acceptable that we cannot well discriminate in favor of any one contributor, but would render to all and each our unqualified thanks for their kind and generous assistance.

We cannot, however, omit to mention a few cases which, owing to peculiar circumstances, have been to us of especial value and interest. Thus, Mr. W. G. Binney, of Burlington, New Jersey, sent us his entire stock of duplicates, which, having been used by him in his many works on American shells, comprised many species very desirable, not only for intrinsic worth, but for collateral considerations, and has also already been of service by furnishing unusual material for our exchanges.

Several special and faunal collections have also been sent us, and deserve particular mention.

From Mr. Henry Dohrn we have two packages, with 130 species, mostly collected by him at the Cape de Verde Islands and on the African coast. Mr. McAndrew sends us 234 species, a large portion of which were dredged by him in the Gulf of Suez, and which, therefore, are particularly valuable for faunal considerations.

Another and very important addition to our faunal collections has been received from Dr. Cox, who sends us two packages containing a series of terrestrial and marine species from a region hitherto very indifferently represented in our collection, and the beauty and perfection of the specimens, in addition to their rarity, render them doubly valuable, and call for our warmest and most hearty thanks.

From J. W. Sever, Esq., of Boston, we received early in the year two packages comprising 177 species, 529 specimens of East India marine shells, which for beauty and perfection could not well be surpassed, and leave us but little to be desired from that faunal region.

Since our last report we have sent to our correspondents, 27 in number, 33 packages, containing 3,151 species and 10,655 specimens. This leaves us in debt to but three persons for exchanges, while we are largely in advance to others, so that this portion of the work of the Museum may be said to be in a very satisfactory condition.

Report on the Articulates, by Dr. Hagen.

The additions to this department in the past year have been exceedingly important:—

By Donation.

1. A very valuable collection from Prof. Ratzeburg in Berlin, containing parts of trees and plants from Europe damaged or injured by insects (dry), with the insects or larvæ in alcohol, all types described and figured in Prof. Ratzeburg's work. 20 species of insects.

2. From Mr. James M. Barnard a collection of patterns of the Japanese silks.

3. From Baron D'OSTEN-SACKEN. His collection of American galls, gall insects, described in the Transactions of the Philadelphia Entomological Society; also many types of galls from Mr. Bassett and the late Mr. Benj. Walsh, from Rock Island, and a valuable lot of European gall insects, types of Dr. Reinhardt. (See below for details about this important collection.)

4. From Mrs. AUGUSTUS HEMENWAY of Boston, the collection of Curculionidæ of the late A. Deyrolle of Paris, containing 10,014 species in over 17,000 specimens. (See below for details about this important donation.)

5. From Mr. J. SHUTE of Worcester, Mass. The currant worm in all its stages, and several other insects, dry and in alcohol.

6. From Mr. P. B. MANN, two boxes of Neuroptera of the United States, dry.

7. From HARVARD COLLEGE, a collection of insects of all orders, formerly belonging to the Harvard Natural History Society.

8. From Mr. BRYANT, a collection of insects from Maryland, dry and in alcohol.

9. From Dr. KREFFT of the Australian Museum in Sidney, a collection of Coleoptera, from Sidney, 231 species in 906 specimens, dry.

10. From Dr. STEINDACHNER of Vienna, a collection of Microlepidoptera, 68 species in 260 specimens, and Macrolepidoptera 58 species in 80 specimens, both from Europe, in beautiful condition, prepared and determined by the renowned lepidopterologist, Mr. Mann, in Vienna. Also determined European Coleoptera, 830 species in 2,105 specimens, from Mr. Thirk, in Vienna.

11. From Prof. L. AGASSIZ, a collection of insects and biological objects, dry and in alcohol, from Bethlehem, N. H., and from Deerfield, Conn., made during the last summer.

12. From Messrs. LOCKWOOD and BLAKE, some Articulata from Cambridge.

13. From Mr. ROLAND THAXTER, a collection of Lepidoptera, from Cambridge.

14. From Mr. ED. BURGESS, a lot of Neuroptera and Diptera, collected in New England.

15. From Mr. A. R. CRANDALL, galls and several biological objects from Cambridge.

16. From Dr. STEINDACHNER, a lot of Coleoptera, from China, in alcohol.

17. From Dr. H. A. HAGEN, galls, gall insects and specimens of wood injured by insects, from Cambridge and the White Mountains.

From Dr. H. A. Hagen, a collection of insects, from Waco, Texas, collected by Mr. Belfrage, Neuroptera 211 specimens, Hymenoptera 240, Orthoptera 58, Hemiptera 251.

18. From Mr. J. Boll, Microlepidoptera and Macrolepidoptera from Bremgarten and Zurich, Switzerland, mostly raised, in superior condition and determined by the renowned lepidopterologist, Prof. H. Frey, in Zurich, 900 specimens.

By Exchange.

19. From Mr. Witte, Berlin, Prussia, a collection of determined Coleoptera, (mostly micros) about 2,000 specimens, many hundred species.

20. From Dr. Kriechbaumer, in Munich, Bavaria, three boxes of determined Hymenoptera, from Europe, Apidæ and Tenthredinidæ, several hundred specimens.

By Purchase.

21. An entomological herbarium, in fine condition, for Microlepidoptera, of Europe, belonging formerly to the late Mr. Lederer of Vienna, collected by Mr. Hofmann in Regensburg, Bavaria, containing 90 species of Tineina.

22. A collection of insects of all orders, made in Dallas, Texas, by J. Boll, 1,600 species in 15,000 specimens; 600 Lepidoptera, many raised, 600 Coleoptera, 100 Hymenoptera, 100 Hemiptera, 100 Neuroptera, Orthoptera, etc., nests and biological objects. (See below for details.)

23. From Prof. F. Poey, insects and larvæ from Cuba, in alcohol.

24. A collection of Microlepidoptera, from Europe, by the renowned lepidopterologist, Mr. Zeller, in Stettin, as types of his work.

25. A collection of Diptera, types of genera, and partly from the United States, from the celebrated dipterologist, Mr. Loew, of Gaben, together with a complete series of his works and pamphlets.

26. A collection of insect formations and biological preparations, from Mr. Brischke, in Danzig, similar to those made before by him for the Museums in Berlin and Tiflis, etc., above 180 species.

The last three collections are ordered not to be forwarded before the transport from Germany is unobstructed.*

For Crustacea and Arachnida.

27. A collection of spiders, types of his works, from the renowned Prof. Menge, in Danzig.

* Nos. 26, 27 have arrived; Nos. 24, 25 may arrive in a fortnight.

28. From Mr. RIGAZZI, of Civita Vecchia, Italy, a great lot of Mediterranean Crustacea, dry.

29. From Mr. J. GRAHAM BRIGGS, spiders in alcohol, collected in Barbados, West Indies.

30. From Mr. H. EDWARDS, Pseudo-scorpions, from California.

31. From Dr. H. A. HAGEN, a lot of Apus cancriformis, from Prussia.

32. From Mr. ED. BURGESS, some Branchipus, from Cambridge.

33. From an unknown party, a Cermatia found living in a tobacco store in Boston, in December.

34. From Capt. GOFF, ship "Derby," collected upon the west coast of Mexico, Scorpions, Phryne, Spiders, Myriapods in alcohol.

35. From Mr. M. M. CARLTON, North Indian Crustacea, in alcohol. Collected in the Himalaya.

36. From Mr. J. BOLL, Crustacea and Spiders, in alcohol. Collected in Dallas, Texas, and Galveston, Texas.

The work of my department was delayed by my voyage to Europe from the month of May till October. Nevertheless, I am very happy to state that the portion of the collection stored in the new pattern of boxes has passed through those most dangerous months for an entomological collection without injury. After a general revision by myself in the first days of May, Mr. P. B. Mann had the kindness to examine the whole collection twice in my absence. After my return, in a general revision, the collection was found to be in a perfectly good condition. The same may be said of the alcoholic collection. It is true, and worth repeating, that the more expensive way of putting up entomological collections, viz., in good and costly cases or boxes, is in the end the safest and cheapest mode, saving time as well as specimens. Even some old collections of exotic insects, formerly much infested, are now nearly safe, through reiterated care and observation. Of course a certain time must always elapse before new additions can be entered in the collection. For examination they are placed in provisional boxes, and are watched for about three months, before being finally arranged in the collection. If they are still found to be in any way infested or in doubtful condition, this care is continued for a still longer time.

Concerning the work in the arrangement of the Articulates, the beautiful and very important donation of Baron d'Osten-

Sacken is in order and fills nearly two cabinets, forming a collection of galls, gall-producers and their parasites probably unsurpassed. This collection is somewhat enlarged by other donations, and the curator will be very happy to receive new objects belonging to this group of insects. Baron d'Osten-Sacken intends to arrange the collection finally himself, in a scientific manner. As he is unsurpassed in the knowledge of this interesting family the collection will have no superior.

The collection of Neuroptera and Pseudo-neuroptera, belonging to the Museum, is now arranged and for the most part determined, filling two cabinets. This work is to be done again, as the collection of the curator has now arrived from Europe, and by permission of Prof. L. Agassiz is to be deposited in the Museum. Except the destruction of eight boxes (containing about three-fourths of the Myrmeleon, one-half of the Chrysopa and one-half of the Sialidæ), the collection is in good order, and has not sustained damages in transportation above the common average. Just the most delicate objects, for instance the biological collection, and the easily broken small families, arrived in perfect order. As the above-mentioned collection contains the types of all the published North American Neuroptera and Pseudo-neuroptera, besides the types of many other publications upon this group, the advantage of studying them will be very great for everybody interested in this branch of entomology.

The collection of Curculionidæ of the late A. Deyrolle of Paris, the princely gift of Mrs. A. Hemenway of Boston, is without any doubt the greatest addition to this department, and brings our collection of this family into the same rank with the oldest and best worked collections in the world. As the insects belonging to this family, almost without exception, live in all parts of plants and trees, they form a considerable agency in the policy of nature. As they are in other ways the most damaging and injurious insects for agriculture and trade, so, by the natural or artificial accumulation of certain kinds of plants, growing out of the progress of husbandry, do they become formidable to man. A collection of this family was, therefore, a special desideratum for a Museum like ours. Mr. E. Deyrolle writes on the collection, which has arrived in perfect condition, that it has been seen by the most prominent entomologists, and that it has served as a basis for the work of the late Mr. Th.

Lacordaire, now the standard work on this family. Indeed the collection contains many determinations in his handwriting. The Apionidæ are determined by the newest monographist, Mr. Wencker; other families by Mr. Jekel; the Hyperides, by Mr. Capiomont; the Pachyrhynches, by Mr. Westwood; the Otiorhynches, by Mr. Seidlitz; the Centorhynches, by Mr. Brisout; the Polydrones, Chlorophanes and Phyllobius (not yet arrived), by Mr. Desbroches de Loges; the Epindes and Microcerites (not yet arrived), by Mr. Jekel; the Cleonides, by Mr. Chevrolat; the Cratopus, by Mr. A. Deyrolle. So far as I know, only the collection of Mr. Bowerbank, containing also those of Mr. Jekel, and now deposited in the British Museum, is richer in species than this one of M. Deyrolle. It is further increased by a number of species, chiefly American, already belonging to the Museum, so that for this family the collection of the Museum can now rival any in the world. The arrangement in our boxes was at once commenced, and nearly one-half of the collection is now arranged.

Besides other work, the curator has begun to arrange and put up safely in new boxes, the Pseudo-neuroptera and Neuroptera of the collection of the late Mr. Th. Harris, belonging to the Museum of the Natural History Society in Boston, and kindly placed in the hands of the curator for this purpose. The collection is a most important one, containing many types of Th. Say and of Mr. Harris himself, and was already in the way to be annihilated by destructive insects.

This work and the study of a considerable lot of insects of the same order of the United States, placed in the hands of the curator, will enable him to give important additions and corrections to his published synopsis of the North American species,—perhaps lead to the preparation of a new edition of this work.

Mr. L. Cabot has begun the study and illustration of the interesting collection of the larvæ of Gomphidæ belonging to the Museum. Nearly all of them are new to science, and any contribution to our knowledge of other larvæ of this family would be an important progress.

The collection of insects of all orders presented by Harvard College has been arranged in separate boxes by Mr. Hubbard and Fr. Howe. It is intended to form the first basis of a student's collection, and will chiefly contain insects to be given into the hands of students beginning to study entomology.

The formation of a separate collection for students is an object of the highest importance. The systematic collection I consider to have the same value as a dictionary for anybody intending to study a language. But while nobody would like to read a dictionary, nobody could study without its help. The arrangement of a scientific collection is the work of a long and careful study, and represents in itself the result of many years' investigation. Even if the Museum, for the sake of more rapid progress, buys a scientific collection, or parts of it, the money spent represents not only the specimens but also the time bestowed upon their identification. Of course a collection representing such a mass of work, and beside this so easily damaged, could not be intrusted to any one not accustomed to handle such valuable objects. The necessary experience must first be acquired by work and study. Besides this the large amount of nearly related forms would not be adapted for elementary study. A student wishing to study the Coleoptera, for instance, would be confused by more than 10,000 species all belonging to the same family. He must first examine a special select collection, a real student's collection, fitted precisely for the purpose of elementary study, and containing the most striking forms of all classes taken chiefly from the country about him, perhaps with the addition of some important forms not represented in the native fauna. It would be very easy to form a most complete and excellent collection of this kind, if the students using them would assist in the enlargement of the collection. Such coöperation would be an admirable training for the student himself, and would at the same time enhance the value of the collections.

As it was announced in the foregoing report, a complete set of instruments for microscopical purposes, and for an intended course on this matter was imported by the curator from Europe. As, in the meantime, another gentleman was engaged to open such a course, the curator would not interfere with his work, and has postponed his own course for a later time. But even now, newly ordered simple microscopes of a new pattern and superior quality, not known here before, will be on hand in the room of the entomological department for any one intending to work in the Museum.

The purchase of Mr. J. Boll's collection of Texan insects is in every way an important addition to the Museum. It was

stated in my last report that specimens of North American Lepidoptera were a desideratum for the Museum. As Mr. J. Boll is a very experienced collector, and a considerable part of his Lepidoptera were raised either from the caterpillar or from the chrysalis, the Museum possesses now a stock of unsurpassed beauty even for Microlepidoptera. As a greater part of the Texan Lepidoptera are to be found living in the Middle States and in New England, the collection of Mr. Boll is a very important addition, giving beautiful specimens for many species before badly represented. Mr. Boll has added some remarks about the plants on which the caterpillars were found, the time of transformation, and similar notes of scientific value. The Coleoptera collected by him are almost equally important for the Museum. The Hymenoptera, Orthoptera, Neuroptera, Hemiptera, form, together with the addition of those collected in Waco, Texas, by Mr. Belfrage, a valuable stock. The whole collection of Mr. Boll, made in a certain limited region and in the course of only one year, affords from its unsurpassed beauty of arrangement a very high testimonial to the collector's ability, and furnishes a model of the way in which insects should be handled and arranged for a collection.

The department has made great progress in European insects. The Lepidoptera, by the beautiful specimens of Micros from Messrs. Boll, Mann and Zeller, will nearly represent three-fourths of the species known, perhaps a little more. The Coleoptera, by the additions before enumerated, will give between two-thirds and one-half of the species enumerated in the newest catalogue of European Coleoptera. I believe this to be a very fair relation.

As to the Crustacea, nothing has been done except the additions above related. The monograph of the Astacidæ of North America, by the curator, is published and now ready for distribution. In the meantime some new species have been received by the Museum.

Dr. Stimpson has completed the examination of the Decapoda brachyura from the deep sea dredgings of Count Pourtales, and his account of them has been published in the "Bulletin"; but the specimens themselves are not yet incorporated into the collection.

Our Annelids still remain in the hands of Professor Ehlers.

1869-70

Report of N. S. SHALER, *Assistant in Palæontology.*

The greater part of my time since my last report has been given to the work of instruction in the Museum. A larger number of students than have ever before sought instruction within the walls of the Museum are now partaking of its advantages. Owing to the illness of Professor Agassiz the whole ot the instruction in zoölogy and palæontology has fallen into my hands, and as teaching of a practical kind, as well as by lectures, had to be given in both these branches to a class that now amounts to thirty-seven students, it will be easily perceived that little time has been left for the special work on the collections. A good deal has been done, however, in the way of improving the mechanical condition of the whole collection and carrying forward its arrangement. By carefully systematizing the work of those persons who are aiding me in my task I have been able to secure as rapid an advance in the work of preparation for exhibition as ever before accomplished during a single year. Miss Cutler has been employed in placing the Lamellibranchiate and Brachiopodous shells on tablets for the exhibition rooms. Of these groups about eight thousand tablets have been completed and are nearly ready for the shelves. Miss Atkinson has been engaged in cleaning the specimens and in making lists of the fossils laid out for exchange. Both these ladies have attained great skill in their respective branches of work, and have displayed a most intelligent and devoted interest in executing the tasks which have come into their hands.

Mr. Crandall has aided me greatly in the work of getting the collection of Lamellibranchiata in order for exhibition. The locality catalogue of the whole of this collection is now made. The specimens are all numbered to correspond with the number on the lists, so that displacement is not likely to occur and can always be rectified. I hope before the next report to announce that the whole collection of Aceptala is ready for the shelves.

The Anticosti collection of fossils, made in 1861 by Messrs. Verrill, Hyatt and myself, consisting in the main of several tons of blocks of stone containing valuable specimens, has been brought into better shape by breaking up those masses and arranging the material for monographic work. This tedious work has required a great amount of supervision. It now

gives us, however, one of the most complete collections of the fossils of one locality ever made in this country. The accuracy with which the localities were determined gives to this collection a peculiar value.

An appropriation having been made for the collection of fossils, Mr. Crandall was sent to some of the important localities in New York State. His work, done with care and great economy, has given us a good amount of material for exchange, and done much to complete our suites of fossils from the Upper Silurian and Devonian of that region.

The Museum has received this year the very extensive and valuable collection made by M. Léo Lesquereux, during his long and important work upon the Carboniferous Fossil Plants of this country. This collection is the largest accession made to the department of palæontology since the purchase of the collections of Bronn and De Koninck. It is believed to be richer in typical specimens than any other American collection, and to furnish the best illustration of the Carboniferous vegetation of this continent ever made. This collection, together with those obtained from Bronn and Heer, will enable us to furnish means for the comparison of European and American fossil plants on a more extensive scale than has yet been undertaken. Special effort should be made to give this collection all possible completeness by collecting the plants of certain localities which are not yet adequately represented. The plants from the Coal Basin of Richmond are specially desirable, and the assistant is about to make an excursion to that region. As the owners of the most considerable coal areas in the world, the people of the United States are more directly interested in the study of the character of the Carboniferous vegetation than those of any other country. Very little labor and expense will enable us to present to the student very adequate means for studying the problems which arise in the scientific or practical investigation of the coal formation.

Seventeen collections have been sent in exchange, and several others destined for institutions in France, Switzerland and Germany, are awaiting the close of the war to be shipped.

The Museum is indebted to the following persons for donations of fossils :—

Agassiz, Prof. L. Fossils from the Connecticut Valley.

Agassiz, A. E. R. (Assistant in the Museum). A lot of fossils from England.

Rice, Lieut. V. H. (U. S. A.). A lot of fossils from the Upper Missouri.

Shaler, N. S. (Assistant in the Museum). Fossils from the Champlain Basin and from New York and Rhode Island.

Report of J. B. Perry, *on Fossils and on the Library.*

In reporting progress at the end of the year, I find my time so crowded with work, that I shall confine myself to simple results without entering to any great extent into details.

During the first part of the year, considerable attention was given to the fossil Corals. This was in the way of identifying species, and perfecting the arrangement of the collection generally. Many of these corals were also cleansed, and partially prepared to be mounted on tablets. In this labor I was aided for four months, by an assistant.

The work on Tertiary fossils, though somewhat interrupted, has been carried forward for the most part, with a good degree of success. I am happy to announce that the cataloguing of the Gasteropoda, which was begun during the preceding year has been nearly completed. The number of parcels of Tertiary Gasteropods now entered on the catalogue exceeds 15,000. While I was engaged in this work, a young lady was occupied in writing the appropriate numbers on the different specimens, or placing them in vials, when too small to receive the numbers; also in preparing tablets with labels, and otherwise assisting me.

Most of my time, from the first of June to about the tenth of November, was devoted to the more thorough arrangement of given groups of Gasteropods; to a revision of my previous identifications; to the preparation of tables containing the results reached, as to specific and generic designations, geologic horizons, and the like; and to the actual mounting of the specimens, as thus prepared, on tablets. The work of mounting has been shared by an assistant, who has been employed during the remainder of the time in removing the soil from the specimens, pasting labels on tablets, and helping me in various other ways.

As the work has gone on, I have taken great pains to separate from the mass of material, all specimens not needed in making up the several collections of the institution. These specimens, having been accurately identified in connection with those reserved for Museum purposes, have been distributed into separate lots and carefully labelled, the specific and generic names, references to original figures, localities from which the specimens came, their geological horizons, and other matters of importance being given with scrupulous fidelity. They thus constitute valuable material for exchanges,—material which, it is hoped, will reflect credit on the Museum, and, as affording valuable aid, prove acceptable to correspondents.

This reminds me that an active correspondence has been kept up during most of the year, with a view to the increase of the Museum collections. As a result, the institution has already received, or is in a way still further to receive, valuable specimens in exchange. For details in regard to exchanges, reference may also be made to the report of Professor Shaler.

A course of thirty-five lectures, *On the Geology of Massachusetts*, is now in progress. In these lectures it has been the aim, while furnishing beginners with necessary instruction in elementary geology, to embody all the trustworthy results historically thus far reached by previous local investigators, as well as the fruit of considerable original examination of the rocks of the State, thus to give the most complete exposition of its geology up to this time rendered possible.

The crowded state of the portions of the Museum now in use, as well as the recent erection of additional parts, suggest the hope that the specimens now crowded in drawers are destined soon to be transferred to the new exhibition rooms, where as duly mounted, labelled and arranged, they may perform their part as public instructors, showing in their quaint and peculiar way what they have to tell, at once of the past history and of the present condition of the globe.

Additions to the Collections Received.

From Professor L. W. Bailey, in exchange.—134 specimens, including radiates, mollusks, articulates, and fish, from the palæozoic rocks of New Brunswick.

From F. Layard, in exchange.—9 landeilo trilobites, from England.

From T. A. Conrad, as gift.—Some 350 specimens of United States tertiary fossils, identified by himself.

From L. E. Hicks, in exchange.—A lot of palæozoic fossils, from Ohio.

From Oliver N. Bryan, in exchange.—193 tertiary fossils, from Maryland.

From France.—A lot of anthropological specimens.

Since November 10th I have been almost incessantly occupied in re-arranging the Museum library. The work is going on steadily, and promises, when completed, to give greatly increased facility in consulting its treasures.

The recent accessions of standard scientific works, periodicals and pamphlets are considerale. The collection of books on entomology, made by Dr. Zimmermann, having been lately secured by purchase, has been duly transferred to the library. There have also been various additions by exchange. The largest additions, however, have come as gifts from Professor Louis Agassiz and from Mr. Alexander Agassiz, the very valuable private library of the former being now in process of transfer to the Museum.

When the new organization of the library is completed, and the many additions are properly entered and arranged, the plan and results will be duly reported.

Report on Fossil Vertebrates, by Dr. G. A. Maack.

The progress made during the past year may be seen by the following statement :—

(A.) The whole collection of fossil Vertebrates, which I found at my arrival in Cambridge scattered over the Museum in various cases and boxes partly not unpacked, is brought at present not only into such order as is necessary for scientific study, but is also so exhibited that every visitor can see what kind of specimens belonging to this department our Museum has in its possession. The time and labor required for this work may be estimated by the fact that every fossil had to be cleaned in order to show its natural appearance.

Without too many details, allow me to state the following results :—

(1.) Besides those fossil Mammalia mentioned in my first report, I have found a large series of very well preserved specimens of *Lagomys*, Cuv., *Arctomys* Gmel. and *Arvicola*, Cuv., besides a lower jaw-cast of *Castoroides ohiensis*, Forster. I found further many horns of different deer-species, and a large quantity of cattle and deer-bones. *Halitherium*, Kaup (syn. *Halianassa*, H. v. Meyer), is well represented by a well-preserved skull, many ribs and back-bones from the miocene deposits of the Basin of Mayence. *Zeuglodon*, Owen (syn. *Basilosaurus*, Harlan), is represented by a skull, several jaw-bones and a large number of teeth. The order of Cetacea is represented by several bones, four ear-bones (Cetotolithes), and several teeth of *Delphinus*.

(2.) The collection of fossil Birds is especially rich in the remains of *Dinornis*, Owen, for which the Museum is indebted to Dr. J. Haast of Christchurch, New Zealand. Four species are very well represented by these fossils, namely: Dinornis crassus, D. casuarinus, D. elephantopus and D. didiformis.

Two well-preserved skulls, one of D. casuarinus, the other of D. didiformis, several rings of the larynx (Cartilago cricoidea), and a piece of an egg, are among these fossils. Besides, we have two good casts of the egg of *Epyornis*, Geoff. St. H., from Madagascar, and some bone-casts of this bird.

(3.) The collection of fossil Reptiles is represented by several turtle species. We find here some typical specimens of *Testudo antiqua*, Bronn, from the miocene formation of Hohenhöven, Swabia; a very good cast of *Palæochelys novemcostatus* Val., from the Gault of the Cap la Hève, near Havre (France); further, *Chelydra Murchisonii*, Bell, from the miocene of Oeningen, Switzerland; some typical specimens of *Trachyaspis Sanctæ-Crucis*, Campiche and Pictet, from the cretaceous formation of St. Croix, Switzerland; few remains of *Apholidemys granosa*, Pomel, from the eocene formation of Cuisse-la-Motte (Dép. de l'Oise), France; some fragments of *Tretosternon*, Owen, from the Wealden formation of Tilgate Forest, Sussex, England; some well-preserved carapaces from the London clay; and several typical specimens of *Chelone valanginiensis*, Pictet, from the cretaceous formation (Neocomien) of St. Croix, Switzerland.

The Saurian order is represented by some *Crocodile* remains

from the green sand of New Jersey; by teeth of *Iguanodon Mantelli*, H. v. Meyer, from the Wealden formation of England; by *Teleosaurus bollensis* (*Gavial de Boll*), Cuv.; by two *Gavial* jaws, one of them from the Kimmeridge clay of Honfleur, France; and by some remains of *Mosasaurus*, Conybeare, besides a good cast of *Mosasaurus Hoffmanni*, Mantell, from the cretaceous formation of the "Petersberg," near Mästricht (Holland).

The order Pterosauria, Owen, is represented by a good cast of *Pterodactylus crassirostris*, Goldf.

The Enaliosaurian order is represented by several well-preserved species of *Ichthyosaurus*, Koenig, namely: *Ichthyosaurus communis*, de la Beche and Conyb., from England and Würtemberg; *Ichthyosaurus tenuirostris*, de la Beche and Conyb., from England and Würtemberg; *Ichthyosaurus acutirostris*, Owen, from England and Würtemberg; *Ichthyosaurus integer*, Bronn, from Boll, Würtemberg; *Ichthyosaurus Cuvieri*, Val., from Cap la Hève, Havre; *Ichthyosaurus quadricissus*, Cuv., from Holzmaden, Würtemberg; further by *Plesiosaurus dolichodeirus*, Conyb.; *Plesiosaurus macrocephalus*, Conyb.; *Plesiosaurus neocomiensis*, Campiche; and by several remains of *Nothosaurus*, Münster (syn. *Dracosaurus* Münster), from the triasique sediments of Gailsdorf, Würtemberg.

The order Labyrinthodontes is well represented by several remains of *Mastodonsaurus Jaegeri*, Alberti (syn. *Salamandroides giganteus*, Jaeger), from the "Lettenkohle" (lower red marls) of Würtemberg; further by several well-preserved skulls of *Archegosaurus Dechenii*, Goldfuss, and of *Archegosaurus minor*, Goldf., from Lebach, near Saarbrück, Prussia.

The Batracian order is represented by three specimens of *Rana* from the lignite formation near Bonn, Prussia. One of them represents the *Palæobatrachus Goldfussii*, Tschudi (syn. *Rana diluviana*, Goldfuss).

(4.) The collection of fossil Fishes is large in specimens as well as in species, and good in their preservation.

(a) The Devonian system is represented by a large number of *Acanthodes pusillus*, Ag.; of *Cheiracanthus microlepidotus*, Ag.; of *Osteolepis major*, Ag.; of *Diplopterus macrocephalus*, Ag.; by several remains of *Coccosteus*, Ag.; of *Pterichthys*,

Ag.; and of *Cephalaspis*, Ag., from the old red sandstone of Scotland.

(b) The Carboniferous system is represented by a large number of *Palæoniscus* and *Amblypterus* specimens, namely: of *Palæoniscus Vratislaviensis*, Ag., from Ruppersdorf, Bohemia; of *Palæoniscus Duvernoy*, Ag, from Münster-Appel, near Kreuznach, Prussia; of *Palæoniscus*, from the Albert Mine, New Brunswick, and from Horton Bluff, Nova Scotia; of *Palæoniscus*, from Burdie-House, near Edinburgh; of *Amblypterus macropterus*, Ag, from Saarbrück, Prussia; of *Amblypterus eupterygius*, Ag., from Saarbrück, Prussia; of *Amblypterus latus*, Ag., from Saarbrück, Lebach; of *Amblypterus lateralis*, Ag., from Saarbrück, Lebach; of *Acanthodes Bronnii*, Ag., from Saarbrück.

Besides, we have many well-preserved *Ichthyodorulites* specimens from this period, and many teeth of the genera *Orodus*, *Cladodus*, *Psammodus*, *Cochliodus*, *Chomatodus*, *Helodus*, *Petalodus* and *Ctenoptychius*.

(c) The Permian system is represented by several *Palæoniscus* species, namely: *Palæoniscus Freieslebeni*, Ag., from Mansfeld, Thuringia; *Palæoniscus magnus*, Ag., from Mansfeld, Thuringia; *Palæoniscus comptus*, Ag., from the magnesian limestone of Midderidge, England; *Palæoniscus macrophthalmus*, Ag., from the magnesian limestone of England; *Palæoniscus glaphyrus*, Ag., from the magnesian limestone of England; *Palæoniscus elegans*, Sedgw., from the magnesian limestone of England; further, by *Pygopterus Humboldtii*, Ag., from Mansfeld; *Platysomus gibbosus*, Ag., from Mansfeld; *Acrolepis asper*, Ag., from Mansfeld.

(d) The Triasique system is represented by teeth of the genera *Hybodus*, *Placodus*, *Ceratodus* and *Saurichthys;* further by a large number of fish-remains from the sandstone of the Connecticut River.

(e) The Jurassique system is represented by many well-preserved *Ichthyodorulites* specimens from the lias of Lyme-Regis, England; by many well-preserved specimens of *Dapedius politus*, de la Beche, from the lias of Lyme-Regis; of *Dapedius granulatus*, Ag., from the lias of Lyme-Regis; of *Dapedius punctatus*, Ag., from the lias of Lyme-Regis; of *Dapedius Colei*, Ag., from the lias of Lyme-Regis; of *Dape-*

dius arenatus, Ag., from the lias of Lyme-Regis; of *Tetragonolepis*, Ag., from Lyme-Regis and from Boll; of *Lepidotus*, Ag., from the lias and from the Purbeck limestone of England; of *Pholidophorus*, Ag., from Lyme-Regis and from Solenhofen; of *Ptycholepis bollensis*, Ag., from Boll, Würtemberg; of *Pachycormus*, Ag., from Boll; of *Ophiopsis procerus*, Ag., from Solenhofen; of *Notagogus Zietenii*, Ag., from Solenhofen; of *Caturus pachyurus*, Ag., from Solenhofen; of *Sauropsis latus*, Ag., from Boll; of *Thrissops*, Ag., from Kelheim and Solenhofen; of *Leptolepis*, Ag., from Lyme-Regis, Boll, Solenhofen and Kelheim; of *Aspidorhynchus*, Ag., from Solenhofen, Kelheim; of *Belonostomus Kochii*, Münster, from Cirin, France; of *Megalurus*, Ag., from Kelheim, Solenhofen; of *Macrosemius rostratus*, Ag., from Solenhofen; of *Pycnodus rhombus*, Ag., from Torre d'Orlando, near Neapel; of *Pycnodus gigas*, Ag., from the Kimmeridge clay of Switzerland; of *Microdon radiatus*, Ag., from the Purbeck limestone of England; of *Cololithes*, from Solenhofen.

Besides we have many teeth of the genera *Hybodus*, Ag, *Acrodus*, Ag., and *Strophodus*, Ag.

(f) The Cretaceous period is represented by specimens of *Beryx ornatus*, Ag., *Beryx radians*, Ag., and *Beryx microcephalus*, Ag., from Sussex, England; by several species from Sendenhorst, near Münster, Westphalia, namely: *Platycormus germanus*, v. d. Mark (syn. *Beryx germanus*, Ag.); *Istieus mesospandylus*, v. d. Mark; *Sphenocephalus fissicaudus*, Ag.; *Sardinius Cordieri*, v. d. Mark (syn. *Osmerus Cordieri*, Ag.); *Sardinoides Monasterii*, v. d. Mark (syn. *Osmeroides Monasterii*, Ag.); *Sardinoides microcephalus*, v. d. Mark (syn. *Osmeroides microcephalus*, Ag.); *Leptosomus guestphalicus*, v. d. Mark; further by *Rhacolepis buccalis*, Ag., from Pernambuco, Brazil; *Rhacolepis Olfersii*, Ag., from Ceara, Brazil; by a large number of fish-remains from the "*terrain cenomanien*" of the upper cretaceous formation from Mount Lebanon and Beirut, Syria; and by teeth of the genera *Corax*, Ag.; *Ptychodus*, Ag.; and *Otodus*, Ag.

(g) The Tertiary period is represented by a very large series of well-preserved fishes from the Nummulitique formation of Monte Bolca, near Vicenza. We find among them representatives of the families *Pycnodontes*, *Sclerodermes*, *Per-*

coides, *Sparoides*, *Gobioides*, *Chætodontes*, *Aulostomes*, *Pleuronectes*, *Scomberoides*. Further, by many fish-remains from the tertiary deposits of Turin; by several species from the "Flysch formation" of the Plattenberg, near Matt, in the Canton Glarus, namely: *Acanus ovalis*, Ag.; *Acanus minor*, Ag.; *Fistularia Koenigii*, Ag.; *Palæorhynchus glaronensis*, Ag.; *Palæorhynchus latus*, Ag.; *Palimphyes latus*, Ag.; *Palimphyes brevis*, Ag.; *Archaeus glaronensis*, Ag.; *Archaeus brevis*, Ag.; *Anenchelum heteropleurum*, Ag.; *Acanthoderma spinosum*, Ag. Further, by a very large series of well-preserved fishes from the fresh-water limestone of the Molasse formation of Oeningen, Switzerland, namely: of *Perca lepidota*, Ag; of *Cottus brevis*, Ag.; of *Acanthopsis angustus*, Ag.; of *Cobitis cephalotes*, Ag.; of *Gobio analis*, Ag.; of *Tinca furcata*, Ag.; of *Tinca leptosoma*, Ag.; of *Leuciscus oeningensis*, Ag.; of *Leuciscus pusillus*, Ag.; of *Aspius gracilis*, Ag.; of *Esox lepidotus*, Ag.; of *Lebias*, Ag.; and of *Anguilla pachyura*, Ag. Further, by several remains from Aix, Provence, with a fine specimen of *Lebias cephalotes*, Ag.; by some fish-remains from the "*calcaire grossier*" of Vaugirard, near Paris, namely: of *Acanthurus Duvalii*, Ag., and of *Zanclus eocaenus*, Gervais; and from the deposits of the Département de l'Hérault, namely, of *Perca Reboulii*, Gerv., and of *Chaetodon Pseudo-Rhombus*, Gerv.; by a fine specimen of *Alosa elongata*, Ag., from Oran, Africa; and by a great number of well-preserved specimens of *Leuciscus papyraceus*, *Ag.*, from the lignite formation near Rott, Siebengebirge, Prussia.

Besides, we have many teeth of the genera *Lamna*, Cuv.; *Oxyrhina*, Ag.; *Otodus*, Ag.; *Carcharodon*, Smith; *Carcharias*, Cuv.; *Notidanus*, Cuv.; and *Myliobates*, Duméril.

(B.) A great part of the skeleton collection is now brought into such order that it can be used for scientific studies. I am able to report that several students have called upon me already for the use of these valuable collections in their investigations. The want of room has thus far prevented me from exhibiting this collection to general visitors. I can say, notwithstanding, that our collection is a very rich one in Mammals, as well as in Birds, Reptiles and Fishes. A beautiful skeleton of Moose forwarded by Prof. A. Müller of Konigsberg, was recently received.

(C.) I have endeavored during this last year, through my personal acquaintances, to enlarge our relations with foreign museums as well as with private friends, in order to stimulate exchange and assist the Museum in further collecting specimens necessary for scientific investigation.

In consequence of my appointment as "Geologist and Naturalist of the Darien Expedition," I am obliged to stop my work at the Museum for several months; but I hope that I shall nevertheless be able to do good work for it during this journey.

[B.]

TRUSTEES OF THE MUSEUM OF COMPARATIVE ZOÖLOGY, 1871.

THE GOVERNOR OF THE COMMONWEALTH,
WILLIAM CLAFLIN.

THE LIEUTENANT-GOVERNOR,
JOSEPH TUCKER.

THE PRESIDENT OF THE SENATE,
HORACE H. COOLIDGE.

THE SPEAKER OF THE HOUSE,
HARVEY JEWELL.

THE SECRETARY OF THE BOARD OF EDUCATION,
JOSEPH WHITE.

THE CHIEF JUSTICE OF THE SUPREME JUDICIAL COURT,
REUBEN A. CHAPMAN.

LOUIS AGASSIZ. THEODORE LYMAN.

JAMES WALKER. JAMES LAWRENCE.
NATHANIEL THAYER. C. W. FREELAND.
SAMUEL HOOPER. SAMUEL ELIOT.
MARTIN BRIMMER.

OFFICERS OF THE MUSEUM OF COMPARATIVE ZOÖLOGY FOR 1871.

His Excellency WILLIAM CLAFLIN, Governor of the Commonwealth, *President.*

THEODORE LYMAN, *Treasurer.*

MARTIN BRIMMER, *Secretary.*

SAMUEL HOOPER, JOSEPH WHITE, NATHANIEL THAYER, JAMES LAWRENCE, *Committee on Finance.*

LOUIS AGASSIZ, JAMES WALKER, SAMUEL ELIOT, CHARLES W. FREELAND, *Committee on the Museum.*

AN ACCOUNT

OF THE

ORGANIZATION AND PROGRESS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE,

IN CAMBRIDGE, MASS.

CAMBRIDGE:
WELCH, BIGELOW, AND COMPANY,
UNIVERSITY PRESS.
1871.

AN ACCOUNT

E. L. Mark

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ORGANIZATION AND PROGRESS

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AT HARVARD COLLEGE,

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CAMBRIDGE:
WELCH, BIGELOW, AND COMPANY,
UNIVERSITY PRESS.
1871.

THE MUSEUM OF COMPARATIVE ZOÖLOGY IN CAMBRIDGE.

[This pamphlet was chiefly prepared last summer while Professor Agassiz was ill and absent from Cambridge. Though he has been consulted about certain statements therein contained, he has had no direct concern in writing it. It is proper to say this, inasmuch as what may come as a very timely statement from friends of the Museum would from its personal character be wholly unbecoming from its Director.]

In the year 1847 the late Hon. Abbott Lawrence gave fifty thousand dollars to Harvard University for the purpose of establishing

THE LAWRENCE SCIENTIFIC SCHOOL.

At that time Mr. Lawrence asked Professor Agassiz if he would accept a professorship in the new School, adding that his favorable answer would be an additional inducement for him to make the endowment. Professor Agassiz accepted the offer, and was soon afterwards appointed Lawrence Professor of Zoölogy and Geology in the Scientific School of Harvard University. He found, on entering upon his duties, that there were no collections in Cambridge with which to illustrate lectures upon Geology and Zoölogy, and that no provision had been made to obtain such collections by purchase or otherwise. He was, therefore, obliged to make them at his own expense, which he did until they had outgrown his means and individual powers. In 1852, when the Professor had already extensive collections, stored partly in his own house, partly in the cellar of Harvard Hall, and partly in a shanty on the Brighton road, the late Mr. Samuel Eliot, who was then Treasurer of Harvard University, raised by private subscription the sum of twelve thousand dollars to purchase these collections and to provide for their arrangement. Professor Agassiz, however, continued to spend all that he could spare of his time and his earnings to increase the collections, until, in 1858, they had outgrown the wants of the College and the scientific students, and a movement was made to build up and organize the Museum, as it now is, as an independent institution. In 1858 Mr. Francis C. Gray, of Boston, died, leaving a bequest of fifty thousand dollars for the purpose of establishing and maintaining a

at the same time leaving it optional with his nephew, Mr. William Gray, whether the Museum should be connected with Harvard University, or with some other institution of the same kind. On the 20th of December, 1858, Mr. William Gray informed the President and Fellows of Harvard University that he presented them with fifty thousand dollars, as bequeathed by Mr. Francis C. Gray, for the establishment of a Museum of Comparative Zoölogy; at the same time making other valuable donations for the benefit of the University. The President and Fellows of Harvard University, in accepting these gifts, voted, —

"That the corporation are duly sensible that the final determination as to these noble charities was left to William Gray, Esq., in his capacity as executor and residuary legatee of his uncle's estate; and they request their President to write a letter of acknowledgment to that gentleman, thanking him for a liberality of conduct and a generous regard for the interests of the University which will forever associate his own and his uncle's name in these wise and munificent endowments."

STATE AID.

In 1859 the matter of State aid to the Museum of Comparative Zoology was brought to the notice of the Legislature through the message of Governor Banks, and the Committee on Education took into consideration the proposition to appropriate money for the erection of a suitable building at Cambridge for the use of that Institution. In February of that year the Committee on Education invited Professor Agassiz to address them on the subject. This invitation was accepted, and in the course of his remarks he said: —

"It is unnecessary for me to state to you that the great object I have in view in appearing before you is the preservation of the collections of zoölogical specimens which I have been for a long time engaged in making. But I have merely laid the foundation of a great museum by my labors of the past six or eight years, and these choice specimens are now in a building which is totally unsafe. . . . . The specimens are preserved in alcohol, and this alcohol is constantly running over, rendering it unsafe to have fire in the building by day or by night. My great object is to have a museum founded here which will equal the great museums of the Old World. We have a continent before us for exploration which has as yet been only skimmed on the surface. . . . . I have recently received a letter from the Director of the Museum at Vienna stating that he had sent me several hundred specimens of fishes from the Euphrates, the Nile, and elsewhere, for which he wished a single specimen of

an American fish of which I had duplicates. My earnest desire has always been, and is now, to put our universities on a footing with those of Europe, or even ahead of them; so that there would be the same disposition among European students to come to America for the completion of their education that there always has been among our students to avail themselves of the advantages of European universities and schools. And I think the time has now come when this object can be gained. This is evident every way, and is seen, more particularly, in the disposition of the professors of Harvard College to acquire and encourage high scientific culture. . . . . I have for several years past been consulting with an architect, my friend Mr. Henry Greenough, in regard to the proper plan on which a museum should be built. It is desirable that it should be fireproof, though a moderate expense would not allow of its being entirely so. The building should be on a large area, and I should hardly wish to have it erected unless with the idea of indefinite extension. My idea in regard to the collections is to furnish you with what money will not buy for you when I am gone,—specimens which will be invaluable because they cannot be easily procured elsewhere. . . . . I receive no compensation whatever for the salaries of my assistants, but pay them out of my own pocket. . . . . Several years since twelve thousand dollars were raised by citizens of Boston to secure these collections for the Scientific School, and I have spent a great part of my earnings in enlarging them. There is not an assistant in my department whom I do not now pay out of my own pocket, and I expect to incur personally the expense of labelling and preparing the specimens when they are put in the new building, should one be erected."

The Committee made a favorable report, and on the 2d of April, 1859, the Legislature of Massachusetts voted that aid should be granted to the Museum of Comparative Zoölogy to the extent of not more than one hundred thousand dollars, payable from sales of lands belonging to the Commonwealth in the Back Bay. The sum of seventy-one thousand one hundred and twenty-five dollars was also raised by private subscription among the citizens of Boston "for the purpose of erecting a fire-proof building in Cambridge suitable to receive, to protect, and to exhibit advantageously and freely to all comers, the collection of objects in Natural Science brought together by Professor Louis Agassiz, with such additions as may hereafter be made to it."

THE PLAN OF THE BUILDING.

In June, 1859, articles of agreement were made and executed between the Trustees of the Museum of Comparative Zoölogy and the President and Fellows of Harvard College, and a piece of land of about five acres in extent was deeded by Harvard College to the Museum for the purpose of erecting a fire-proof building to contain

exhibition-rooms, lecture-room, working-rooms, etc. Prof. Agassiz had for a long time discussed the plan and the requirements of a museum with Mr. Henry Greenough of Cambridge; and now, when the opportunity offered for carrying out these views, Mr. Greenough and Mr. George Snell, the architect, of Boston, with a generosity which has never been publicly noticed, and should not be forgotten, volunteered their services to make the plans of such a museum as Professor Agassiz had contemplated for many years. This museum, when completed, was to consist of a main building 364 feet in length by 64 feet in width, with wings 205 feet in length and 64 feet in width; but as the present object was to meet the immediate requirements of the Museum, it was decided that the first portion built should only be two fifths of the north wing, which would give ample room for the collections of Professor Agassiz and for the necessary working-rooms, lecture-room, etc. required for the assistants and students connected with the Institution.

THE LAYING OF THE CORNER-STONE

of the Museum of Comparative Zoölogy took place with appropriate ceremonies on the 14th of June, 1859. Governor Banks opened the proceedings by briefly stating the nature of the occasion, and introduced Professor Agassiz, who made a short address, expressing the pleasure with which he participated in the ceremony of the day.

"I am glad," he said, "before my departure for Europe to see ground actually broken in the establishment of another purely American institution of science, — one which by its successful operation cannot fail to release America from foreign dependence in matters of science and from that criticism and control which the learned men of Europe have heretofore assumed exclusively to exercise. It is gratifying to observe what has already been accomplished; a collection has been gathered which is sufficient to teach American students all that they can learn of comparative zoölogy, until they are prepared to undertake their own original investigations, and the means have been provided to erect a safe and convenient building to preserve this collection. Moreover, it is part of our design to expend as little as possible of our means in brick and mortar. After completing the building to be this day begun, we shall still have a part of our funds applicable to the enlargement of the collection. At present we shall be content with half of one of the wings of the great building; but extensive as is the plan, I cannot doubt that the whole will ultimately be completed. I feel sure that means will be provided as fast as they can be usefully applied, and if I should not survive to witness the completion of the whole design, I know that I leave behind me among my pupils those who will be amply able to aid in carrying

forward the work to a successful end. It has been suggested that all this gratifying success has been due to my efforts; but I have done nothing except to point out what was needed and what might be accomplished. It is to the liberality of the citizens of Boston, and to the generosity of the Legislature, acting in accordance with the wise suggestions of the Governor, that we owe an institution which cannot fail to prove an honor and an advantage to the State."

INTERESTING CORRESPONDENCE.

In October, 1859, Professor Agassiz addressed the following letter to the Trustees of the Museum: —

Mr. President and Gentlemen, — When I appeared last spring before a Joint Committee of the House and Senate, to solicit aid in behalf of a Museum of Comparative Zoölogy, I mentioned incidentally that it was my intention to present to such an institution, after it should have been founded, whatever collections I may myself possess that could be acceptable for its increase. It is now my desire formally to fulfil my engagement. Allow me to state in this connection that, since 1852, when the collections I had made up to that time were secured for the University by a subscription raised among citizens of Boston, I have taken charge of those specimens and cared for their safe preservation by providing for jars, alcohol, and the other means of keeping them in a good condition, and also largely increased the collection by securing at my private expense as many more specimens as I could up to last year, when the Corporation of Harvard College began to aid me by a monthly allowance, until the movement was set on foot which has ended in the establishment of the Institution now in course of operation. What I now offer to you for acceptance is the collection I have made since 1852, and any claim I may have upon the Museum for the care of that part of the collection secured at that time for the University. The sums I have paid in cash for making these additions to the Museum, including the expenses for preserving the specimens belonging to the University, amount to ten thousand dollars, not counting my travelling expenses when making excursions and longer journeys for the purpose of gathering specimens. I hope, Mr. President and gentlemen, you will accept this contribution to the Museum from a student of Nature who feels deeply grateful for all that you are doing for the advancement of his favorite science. Please, Mr. President and gentlemen, to accept the assurance of my highest regard and of my entire devotion to our scientific institutions.

L. Agassiz.

THE REPLY.

To this letter the Trustees made the following reply: —

To Louis Agassiz, *Professor of Zoölogy and Geology in the Lawrence Scientific School, Harvard College.*

Sir, — The subscribers, Trustees of the Museum of Comparative Zoölogy, at their last meeting, received from you a communication, offering, as a donation to the Museum, all the collections you have made in Zoölogy since the year 1852. This gift they gratefully accept. In so doing, however, they desire to express their conviction that, while the sum of ten thousand dollars, by which in general terms you describe the cost to yourself of these collections, is undoubtedly much below the sum you have thus expended, still they are sensible that the importance of what you have now so freely contributed to the cause of science is to be measured by no such modes of computation. For they are aware that to you personally — to your genius, your love of science, your courage and disinterestedness — the original establishment of the Museum of Comparative Zoölogy is due more than to any other cause whatever, or to all other causes united. They are aware that you have personally given what they believe will prove a decisive and guiding impulse to the study of Natural History in these United States. They therefore cannot accept your munificent gift without remembering that, whatever may have been its pecuniary cost, your character and services have imparted to it much the largest portion of its great and acknowledged value. Neither can they omit to express their earnest hope, not only that you may long live to enjoy and sustain the Institution which you have founded, but that future generations, mindful of what they owe you, may, with equal fidelity, carry on the work you have begun with so much energy and success.

We remain, very faithfully, your friends,

Nathaniel P. Banks, *Governor of the Commonwealth;*
Eliphalet Trask, *Lieutenant-Governor;*
Charles A. Phelps, *President of the Senate;*
John A. Goodwin, *Speaker of the House of Representatives;*
George S. Boutwell, *Secretary of the Board of Education;*
Lemuel Shaw, *Chief Justice of the Supreme Judical Court.*

William Gray,	Nathaniel Thayer,
Jacob Bigelow,	Samuel Hooper,
James Walker,	Samuel G. Ward,
George Ticknor,	James Lawrence,

Trustees of the Museum of Comparative Zoölogy.

ACTIVITY OF THE MUSEUM. — PROFESSOR AGASSIZ'S REPORTS.

In December, 1859, the building was sufficiently advanced to allow Professor Agassiz, on his return from Europe, to move the greater part of his collections from the insecure places where they were stored into the fire-proof Museum for which he had so long wished. In May, 1860, the building was completed, and was found to be so well fitted for the purposes intended that Professor Agassiz declared, that, after his recent examination of the principal Museums in Europe, he would not alter it in any respect if he could do so by a wish. The annual reports of the Director of the Museum for the years 1861 and 1862 contain little beside accounts of the additions to the collections. When the war between the Northern and Southern States broke out the Museum was a sufferer, for several of the assistants upon whom Professor Agassiz relied for valuable services joined the Northern army. The funds, also, of the Museum were running low; but it was no time to ask for further supplies when all the resources of the country, both public and private, were required to put down the Rebellion. Still, the Director, in his report for the year 1863, was able to record with gratitude "the liberality of the Legislature in granting $10,000 for the publication of an Illustrated Catalogue of the Museum, which will enable us to lay the results of our investigations before the scientific world in an appropriate form, and thus extend the usefulness of our Institution beyond the limits of those who have immediate access to its over-crowded rooms."

He also says in his report, speaking of the continued increase and development of the Museum: —

"Had my task from the beginning been restricted to the putting up of a Museum that should answer the wants of the University within the limits of our present means, I might be blamed for extending its sphere of action; but I understood the object of this organization to be the founding of a great Museum, and I am happy to be able to say that the general frame of such an institution is not only fairly laid out, but is already so far advanced in some of its most important features as to challenge competition."

CONTRIBUTIONS FROM BRAZIL.

The Museum continued to progress steadily, although the increase of its collections and the development of the system of instruction, which is one of the most valuable features of the Institution, caused the want of an adequate income to be every day more sensibly felt.

Among the many friends of science, both of high and low degree, no one had shown more interest in the progress of the Museum than Dom Pedro the Second, the present Emperor of Brazil. His Majesty had caused to be made for the Museum a large collection of the fresh-water fishes of the vicinity of Rio Janeiro, most interesting in themselves, and especially so to Professor Agassiz, as part of them were among the first objects which attracted his attention in the earliest years of his scientific pursuits, when, as a young man, he had been selected by the naturalist Martius to describe the fishes brought back by Spix and Martius from their celebrated journey to Brazil, undertaken in 1817–20, on the occasion of the marriage of Dom Pedro the First.

For a long time Professor Agassiz had wished to visit Brazil on a scientific expedition; but to do this effectually he would require a corps of trained assistants, and large means both for the expenses of travelling and for preserving the collections made on the way, and he saw no possibility of providing for such an undertaking. The excursion would be a delightful one, but, single-handed and without sufficient means, he could make but little use of the opportunities which were before him.

While he was pondering over his difficulties he met Mr. Nathaniel Thayer, of Boston, who had always been a most generous friend of the Museum, and he immediately introduced the subject, asking Professor Agassiz what he should require to make the proposed journey according to his wishes. On learning the Professor's views on the subject he said: "Take six assistants with you, and I will be responsible for all their expenses." It may be added that

proved longer and much more costly than was at first anticipated, and Mr. Thayer not only provided for all the expenses, both personal and scientific, of these six assistants, but until the last specimen was stored in the Museum he continued to advance whatever sums were needed for the expedition.

Mr. Allen McLane, President of the Pacific Mail Steamship Company, on hearing of Professor Agassiz's wish to visit Brazil, had invited Mrs. Agassiz and himself to make the voyage on board the steamship Colorado. On learning that the plan had taken the form of a scientific expedition, he at once enlarged his hospitality to suit the case, and offered to the whole party, now consisting of sixteen persons, free passage on board the magnificent steamer just then starting for the Pacific Coast. The invitation was most gratefully accepted. They arrived in

Rio Janeiro on the 23d of April, and Professor Agassiz says in his Report to the Trustees of the Museum: —

"The Brazilian Expedition, fitted out and sustained by individual generosity, was treated as a national undertaking, and welcomed by a national hospitality. From the moment of our landing in Rio de Janeiro the government offered me every facility for my undertaking. Nor was this an empty civility. We found ourselves guests in every public conveyance, and our large collections were constantly transported free of freight. On our arrival at Para the Amazonian Steamship Company placed a fine steamer, furnished with everything needed by the whole party, at my disposition for one month. Returning somewhat later from the Upper Amazons, I found a steamer of war awaiting me at the mouth of the Rio Negro, which had been sent up by order of the Emperor for my use during the remainder of my stay in the waters of the Amazons. Nor was this all. Canoes and men were provided for me whenever I required them; and wherever I arrived, I found that directions had been given to the local authorities to furnish me with whatever I required for my scientific objects. With such facilities, it is not strange that we should have made larger collections than have ever been got together in the same time before. With a corps of six assistants, already trained in the work of the Museum, and our party being also strengthened by the addition of six volunteer assistants, I was able to lay out a scheme for a thorough exploration of large tracts of country in Brazil, parts of which had not yet been visited by zoölogists."

We have not space to follow Professor Agassiz and his party through all their wanderings in Brazil. During the few weeks passed in and about Rio Janeiro, on first arriving, all the members of the expedition were engaged in collecting the natural products of the sea and adjoining country, — making excursions in various directions to obtain as complete a knowledge as possible of the characteristic fauna of the province of Rio de Janeiro, — following the Dom Pedro Railroad, and making geological surveys along its route, — collecting fishes in the Rio Parahyba, and visiting the more accessible portions of the adjoining province of Minas Geraes. In the mean time Professor Agassiz was making preparations for the expeditions he intended to send into the interior. This was no light task; for in a country where there are no established means of internal communication, and where mules, guides, *camaradas*, and even an armed escort, may be necessary, and must be provided for in advance, the preparation for a journey through the interior requires a vast deal of forethought.

One of the principal objects during the whole journey was to secure accurate information concerning the geographical distribution of the aquatic animals throughout the regions that were visited. Upon this

subject there was little precise knowledge, even the best known among the fishes, reptiles, etc. of the Brazilian waters being entered in zoölogical records simply as living in Brazil, or more generally as found in South America. As the distribution of species lies at the very foundation of the question of their origin, Professor Agassiz wished to ascertain as far as possible what were the areas and limits of their localization. With this view parties were sent off to explore the headwaters of the Rio Doce, Rio Mucury, Rio Jequitinhonha, Rio das Velhas, and Rio San Francisco, in the interior of Brazil, while others were examining the lower course of these rivers along the Atlantic coast. The party which started together for the interior, Messrs. St. John, Allen, Ward, and Sceva, divided their forces after a time. Mr. Sceva remained in the vicinity of Lagoa Santa, to seek for fossil remains in the regions made famous by the researches of Dr. Lund, and afterwards returned to the province of Rio de Janeiro, establishing himself at Canta-Gallo, where he made a large collection of skeletons. Mr. Ward extended his journey across the whole continent to Para, passing from the middle course of the Rio San Francisco into the basin of the Tocantins, which he descended to the Amazons. Mr. St. John passed from the San Francisco into the basin of the Parnahyba, which he followed as far as Theresia, whence he crossed to Caxias, followed the valley of Piauhy to Maranham on the coast, and finally joined Professor Agassiz at Para. Mr. Allen left his companions at the San Francisco, and returned across the country to Bahia, taking the collections under his charge. During this time Messrs. Hartt and Copeland undertook an entirely different exploration in the eastern portions of the province of Rio de Janeiro, Spiritu Santo, and the southern part of the province of Bahia. Their collections were large, and Mr. Hartt's geological report was exceedingly interesting.*

When Professor Agassiz had finished all the necessary arrangements for starting these expeditions, he prepared for his own journey up the coast to Para, and from there up the Amazons. His departure was delayed, however, on account of the steamer having been taken by the government to convey troops to the seat of war, — the war with Paraguay being at its height at that time, — and he did not leave Rio Janeiro until the 25th of July, three months after his arrival from New York. The party who were to accompany Professor Agassiz were

* One of the direct results of the expedition is a volume from Mr. Hartt on the physical geography and geology of Brazil; and he is still following up his researches there, having just returned from a new exploration, bringing with him very important collections and valuable additions to our knowledge of the regions he has visited.

Messrs. James, Dexter, Hunnewell, Thayer, and Burkhardt;* to these were added Mr. Bourget, a French naturalist established in Rio Janeiro, whose services Professor Agassiz engaged as preparator during his residence in the region of the Amazons, and also Major Coutinho, a young Brazilian officer belonging to the corps of engineers, and detailed by the Emperor to accompany the expedition. The assistance of Major Coutinho was invaluable throughout the journey, as he had been engaged for several years in explorations on the Amazonian rivers, and was also well acquainted with the language of the natives.

The expedition arrived at Para, at the mouth of the River Amazons, on the 11th of August, the steamer having touched at Bahia, Pernambuco, Ceara, Maranham, and other ports on the coast.

On the 20th of August Professor Agassiz started on his long-wished-for trip up the Amazons. Subjoined is a brief paragraph from his own report:—

"Once in the waters of the great river, I divided my forces in order to survey simultaneously various parts of this vast fresh-water system, wishing to ascertain how far the distribution of its inhabitants was local, or whether the same species might be found at the same moment in different parts of the main stream and its tributaries. This precaution led to results which amazed me, though I was in part prepared for it by my knowledge of other aquatic faunæ. Not only did I find the number of species in these waters exceeding by thousands all former estimates, but I found their localization so precise and definite that new combinations occurred at given intervals along the main stream, while every forest lake and all the lesser watercourses had their special faunæ. I neglected no opportunity of verifying the accuracy of my results, visiting the same regions at different seasons of the year, repeating my collections that I might have the fullest means of comparison, and, as I have said, stationing my parties at considerable distances in order that, by making simultaneous collections, we should ascertain what was the range of the species. All my young friends — and those I had with me on the Amazons were chiefly volunteer assistants — gave me most hearty and efficient co-operation. Besides rendering much important aid in the general work, and making special collecting excursions on the Rio Tapajos and the Rio Negro, Mr. Dexter prepared a very valuable collection of birds. In his voyage up th River Tapajos he was accompanied by Messrs. James and Talisman; on that of the Rio Negro by Mr. Talisman alone. Mr. James, in company with Mr. Talisman, ascended the River Içá and the River Yutahy,† and brought down very valuable additions to our fishes, while

* Mr. Burkhardt, the artist of the Expedition, and Professor Agassiz's friend and companion for many years, died shortly after his return to this country, from a disease which, though not contracted in Brazil, was no doubt aggravated by the hot climate of the Amazons, and by his devotion to the work he had undertaken, and which he could not be persuaded to relinquish even after his health was seriously impaired.

Mr. Bourget at the same time was employed in making collections in the River Yavary and the Solimoens about Tabatinga. Besides these special excursions, all my assistants, including Mr. Thayer and Mr. Hunnewell, had their separate stations at different times, and made very important local collections, — Messrs. James and Hunnewell at Obydos, Messrs. Thayer and Bourget at Cudajas, Mr. James at Manacapuru, Mr. Bourget at Santarem. To Mr. Hunnewell, beside his general assistance as a member of the working corps, I am indebted for a series of photographic portraits of Indians and of the various cross-breeds arising between Indians, whites, and blacks, taken by him at Manaos. Mr. Thayer was also very successful in collecting at Serpa and at Lago Alexo. Although zoölogical research and the forming of collections for the Museum were the chief objects of my journey, I also made as complete a geological survey of the valley of the Amazons as was possible under the circumstances. As my results in this direction do not, however, especially affect the interests of the Museum, I need enter into no details concerning them here. I should, however, add that I made the largest collection ever brought together of palm woods and fruits, bringing away many complete stems of palm-trees, or, where this was not possible, fragments large enough to show their structure, and preserving the fruits in alcohol. This is especially valuable in a Comparative Museum like ours, inasmuch as we seek to combine the past history of the organic world with its present condition, and there is no family of plants now existing so illustrative of the ancient forests as the palms and tree-ferns."

A full account of this most interesting trip was published, after the return of the expedition to the United States, under the title of "A Journey in Brazil," by Professor and Mrs. Louis Agassiz, to which we refer our readers for further information concerning the trip up the Amazons.

The time expended on this journey was about eight months. Professor Agassiz returned to Para on the 4th of February, 1866. He passed nearly six weeks at Para and in the vicinity, studying the geological formation of the entrance to the river. All great rivers, as the Nile, the Mississippi, the Ganges, the Danube, have their deltas; but the largest river in the world, the Amazons, is an exception to this rule. What, then, is the geological character of the great island of Marajo, which obstructs its opening into the ocean? This was a question of great interest to Professor Agassiz, and he has given his answer in the Report of his Journey, where he shows it to be no delta, but a "cut off" from the drift of the valley.

On the 26th of March they left Para and went down the coast to Ceara. Professor Agassiz's object in stopping here was to satisfy himself by direct investigation of the former existence of glaciers in this province, and, if possible, to find some traces of the southern

lateral moraine, marking the limit of the mass of ice which he supposes to have filled the Amazonian basin in the glacial period. In the Amazonian Valley itself he had seen that all the geological phenomena are connected with the close of the glacial period, with the melting of the ice and the immense freshets consequent upon its disappearance. Indeed, the valley of the Amazons is the counterpart of our western prairie, only submerged to a great extent at the present time. On leaving the Amazons, the next step in the investigation was to seek the masses of loose materials left by the glacier itself. The time for so important a task was very short, but Professor Agassiz was well pleased with his investigations, for he found on the Serra of Aratanha the glacial phenomena as legible as he had found them twenty-five years before on the hills of Cumberland and Northumberland, of Wales, Scotland, and Ireland, and more recently throughout New England. He says: —

"In the whole valley of Hasli there are no accumulations of morainic materials more characteristic than those I have found here. I hope that before long some members of the Alpine Club, thoroughly familiar with the glaciers of the Old World, not only in their present, but also in their past condition, will come to these mountains of Ceara and trace the outlines of their former glaciers more extensively than it has been possible for me to do in this short journey."

THE RETURN. — THE MUSEUM.

On their return from this expedition in Northern Brazil they arrived in Rio de Janeiro at the end of April, and the remainder of their stay in Brazil was passed in revisiting the many places of interest in the neighborhood of Rio. Having received an invitation from Mr. C. K. Garrison, President of the Brazilian and North American Steamship Company, they took passage on board one of the fine steamers belonging to that company for the United States, in the summer of 1866, Professor Agassiz bringing with him a collection of Natural History from Brazil which added immensely to the wealth of the Museum; and for a long time he was constantly occupied in arranging these numerous specimens. He found, however, that the present building was altogether too small for even the proper storing of his lately acquired treasures, without any attempt to exhibit them. By far the most important part of the collections were packed away in barrels and boxes, rendering the use of specimens for study very laborious, owing to the loss of time in finding what was wanted. And as the whole available space, not only in the cellar and the working-rooms, but also in the exhibition-rooms, was occupied with unassorted collections, it was impossible to give to

the public the advantages for observation which was one of the earliest intentions of the Museum. In fact, the whole Museum was becoming a large storehouse rather than a well-arranged scientific collection. In reference to these difficulties, Professor Agassiz, in his annual report for the year 1867, said: —

"The general usefulness of the Museum is crippled by the limited room allotted to the public exhibition of the specimens. In order to heighten the scientific importance of the Museum I have from the beginning resisted the temptation of making it attractive to the many by putting up showy specimens, and devoted all the means of the Institution to increasing its purely scientific resources. But while this has greatly raised the intrinsic value of the collections, it may, in a measure, have perilled the popularity of the Museum; and it is time that something should be done to gratify the curiosity of the public, who have thus far generously approved the expenses incurred, and the appropriations made by the Legislature to help our establishment. This, however, cannot be done without considerable expense, as our building is totally inadequate to the proper exhibition of the collections stored in it at this moment. Until the northern wing is fully completed it will be impossible to begin a general systematic arrangement of all our scientific possessions. It is not asking too much that these collections should now be exhibited to the public, and I can truly say that were all our treasures fairly laid out, so that the whole could be seen at a glance by intelligent visitors, our citizens, when visiting similar institutions abroad, could with pride point out what Massachusetts has done for science, and confidently affirm that their Museum fears no comparisons."

AN ELOQUENT REPORT.

In 1868 the Legislature voted twenty-five thousand dollars a year for three years to the Museum, on condition that a similar sum should each year* be raised by subscription among private individuals, who were willing to assist in the cause of science. Professor Agassiz, in his report, says: —

"This year has been a memorable one in the history of our Institution. When I prepared my report for the year 1867, it was under the depressing conviction that unless a large sum could be promptly obtained, the labor of years would be made of no avail, and the value of the materials collected in the Museum so impaired for want of the means essential to their preservation that they would become in a great degree useless. By the intelligent liberality of the Legislature, who took this matter into earnest and thoughtful consideration, and the generous co-operation of individuals, this danger is averted. I have never felt so hopeful of the future of the Institution which has so long been my care as now.

"At the last meeting of the Board of Trustees a vote was passed devoting the seventy-five thousand dollars granted to the Museum by the Legislature

* Called in the Appendix 1st, 2d, and 3d subscriptions.

of 1868 to the extension of the present building. While I rejoice in the prospect of this new building, as affording the means for a complete exhibition of the specimens now stored in our cellars and attics, and encumbering every room of the present edifice, I yet can hardly look forward to the time when we shall be in possession of it, without shrinking from the grandeur of our undertaking. The past history of our science rises before me with its lessons. Thinking men, in every part of the world, have been stimulated to grapple with the infinite variety of problems connected with the countless animals scattered without apparent order throughout sea and land. They have been led to discover the affinities of various degrees and different kinds which bind together this host of living beings. The past has yielded up its secrets, and has shown them that the animals now peopling the earth are but the successors of countless populations which have preceded them, and whose remains are buried in the crust of our globe. Further study has revealed relations between the animals of past time and those now living, and between the law of succession in the former and the laws of growth and distribution in the latter, so intimate and comprehensive that this labyrinth of organic life assumes the character of a connected history, which opens before us with greater clearness in proportion as our knowledge increases. But when the museums of the Old World were founded, these relations were not even suspected. The collections of Natural History, gathered at immense expense in the great centres of human civilization, were accumulated mainly as an evidence of man's knowledge and skill in exhibiting to the best advantage not only the animals, but products and curiosities of all sorts, from various parts of the world. While we admire and emulate the industry and perseverance of the men who collected these materials, and did in the best way the work which it was possible to do in their time for science, we have no longer the right to build museums after this fashion. The originality and vigor of one generation become the subservience and indolence of the next, if we do but repeat the work of our predecessors. They prepared the ground for us by accumulating the materials for extensive comparison and research. They presented the problem; we ought to be ready with the solution. If I mistake not, the great object of our museums should be to exhibit the whole animal kingdom as a manifestation of the Supreme Intellect. Scientific investigation in our day should be inspired by a purpose as animating to the general sympathy as was the religious zeal which built the Cathedral of Cologne or the Basilica of St. Peter's. The time is past when men expressed their deepest convictions by these wonderful and beautiful religious edifices; but it is my hope to see, with the progress of intellectual culture, a structure arise among us which may be a temple of the revelations written in the material universe. If this be so, our buildings for such an object can never be too comprehensive, for they are to embrace the infinite work of infinite wisdom. They can never be too costly, so far as cost secures permanence and solidity, for they are to contain the most instructive documents of Omnipotence."

CLOSE OF THE FIRST DECADE.

In his report for the year 1869 Professor Agassiz says: —

"It is now ten years since, in 1859, the Museum of Comparative Zoölogy in Cambridge was organized. We have closed our first decade, and it seems, therefore, appropriate to review the work thus far accomplished, and to see where it has brought us. Beginning with very small means and scientific materials, the basis for which was chiefly the Gray fund and my private collection of specimens; hardly known at all abroad and attracting but little notice in those days at home, the Cambridge Museum occupies now a very honorable place among the prominent scientific institutions of the world. It is in no spirit of egotism that I, as Director of this establishment, speak thus of its present standing. But it is no more than fair that the Legislature of Massachusetts and the individuals who have so generously sustained this undertaking should know that their liberality has not been misapplied. Familiar as I am with the history of museums, it is an astonishment and a gratification to me to find that in this short time we have attained a position which brings us into the most intimate relations with the first museums of Europe; we have a system of exchanges with like establishments over the whole world; while the activity of original research in our Institution, and its well-sustained publications, the possibility of which we owe to the liberality of the Legislature, make it one of the acknowledged centres of scientific progress. Nor is this all. Men of high scientific standing in Europe are tempted to come and join us on the moderate salaries we are able to give, for the pleasure of working up collections in some respects more complete and more interesting to the student than any now existing. . . . . When our building was first put up, ten years ago, it was thought sufficient, and I myself then deemed it large enough, for the needs of the establishment. But so great has been the increase of our collections since that time that at this moment the museum overflows from garret to cellar; there is hardly room to move between the boxes, barrels, and temporary shelves put up for the accommodation of specimens, and with the utmost economy of space it is almost impossible for our daily increasing number of workers to proceed with their labors. Indeed, many most important and interesting features of the Museum must be ignored till we have more room, — as, for instance, the large and perfectly unique collection of palms and tree-ferns, with flowers and fruits preserved in alcohol, one of the most valuable results of the Thayer Expedition. . . . . The same is true of many other collections of equal interest in our Museum, — as, for example, that of the fishes from the Amazons and other parts of Brazil. But a very small portion of the rich harvest from the Thayer Expedition has as yet been seen by the public."

THE PRESENT CONDITION OF THE MUSEUM.

We have thus followed the course of the Museum from its early beginning with the donation of Mr. Francis C. Gray and the private collec-

tion of Professor Agassiz until the present time, when it may claim to rank among the foremost institutions of its kind; for although the British Museum in London and the Jardin des Plantes in Paris are on a very much larger scale, yet in certain departments, such as corals, echinoderms, and fishes, the Museum of Comparative Zoölogy is superior to both, while the increase of its collections since its existence, and the prominence it has attained among other museums, is such as no like establishment has reached in the same time and with the same means.

One word more respecting the collections of the Museum as they appear at present, and the intended arrangement when the new building, now in course of erection, is completed.

From want of space the greater part of the Museum as it now exists is occupied by working-rooms and store-rooms, and only four rooms are devoted to exhibition. Each of these contains the representatives of one great division of the animal kingdom, and it is intended to complete them in such a manner that they shall exhibit in an easy and conspicuous way the natural relations of all the animals known in creation. In the new building now going up — which adjoins the present museum, and is to be of equal dimensions — it is intended to exhibit all the animals peculiar to the different parts of the world in such a manner as to impress the observer with their actual association in nature, so that the student of Natural History shall be able to make himself familiar in one part of the building with the latest result of scientific research in working out the system of thoughts which bind together the whole animal kingdom as a unit; while in the other part of the building the geographical distribution of animals upon the whole surface of the earth, and their various combinations and associations in different continents will be made apparent. Such a twofold arrangement of collections has never yet been attempted in any museum, not even in the largest and most prominent institutions of the kind in Europe. The fossil remains of past ages will be exhibited in like manner in such a way as to display at the same time their order of succession in geological periods and their relations to the animals now living. It is intended to complete this plan by exhibiting also the different stages of growth of all known animals, from their earliest period of development in the egg to their adult condition. The plan of the Director is, in short, to make the Museum illustrate the history of creation, as far as the present state of scientific knowledge reveals that history; but although the addition to the Museum will double the amount of room, the whole of this scheme cannot be carried out at present, and a large part of the collections must still remain in the store-rooms until another section of the building can be completed.

Such is the present condition of the Museum, looked upon simply as a collection of objects of Natural History, brought together not as an accumulation of curiosities, but combined with reference to a comprehensive idea, and intended to stimulate original research and to give the student of Nature such abundant materials as have never before been provided for comparison and investigation.

But what has it done for general education? This is a question which its founders and supporters may fairly put. It may be answered that in giving to naturalists rare opportunities for study, in training the few exceptional men who care to devote their whole lives to a pursuit so unremunerative as that of Natural History, it is fostering general culture and aiding in the great work of education. But this is a distant and indirect way of influencing the community; it neither can nor ought to satisfy the men who established the Museum. Natural History, at least as far as it relates to agricultural pursuits, ought indeed to be taught in every public school. But no beginning can be made before teachers are prepared, and there is now too little encouragement given them to engage in the study. The introduction of text-books on Natural History into the schools, from which pupils may be made to recite to teachers who know little of the subject, would be worse than useless; for it would kill the spirit of observation, which the study of Nature eminently fosters. It should, therefore, be generally known that from the very beginning the Director has made it one of the chief aims of the Institution to educate young men, not only as students of Nature, but as teachers also, and that the Museum of Comparative Zoölogy affords the best opportunity in the country for this kind of preparation. From its laboratories there have already gone out a large number of trained workers, now established as professors, or explorers, or directors of scientific institutions. Among these may be mentioned Dr. Wm. Simpson, Director of the Academy of Sciences of Chicago, Professor J. LeConte of the University of California, Professor Clarke of the University of Kentucky, Professor Verrill of Yale College, Professor Hartt of Cornell University, Professor Morse of Bowdoin College, Mr. Putnam, Director of the Peabody Museum in Salem, Professor Packard of the Massachusetts Agricultural College, S. H. Scudder, late Custodian of the Boston Society of Natural History, Professor Hyatt of the Institute of Technology, Orestes H. St. John, officer of the Iowa Geological Survey, Professor Tenney of Williamstown College, W. H. Niles of the Teachers' Institute and others. To these should

be added the names of several teachers and investigators who, although their scientific education has not been wholly received at the Museum of Comparative Zoölogy, have studied there for a longer or shorter time under the direction of Professor Agassiz. Such are Mr. Cyrus Warren now Professor of Chemistry in the Technological Institute, Professor Kerr, Superintendent of the Geological Survey of North Carolina, Professor Chandler of the Mining School of New York, Mr. Wing, Professor of Chemistry in Cornell University. Professor Elder of Acadia College, Nova Scotia, Professor Dimond, Fish Commissioner of New Hampshire, Professor Hills of Dennison College, Ohio, etc., were also pupils of the Museum under Professor Shaler,— not to mention many others who have been for a shorter time connected with the Institution. Many of the most efficient officers and assistants of the Museum itself are men who owe to it their scientific education, as Professor N. S. Shaler, Mr. Theodore Lyman, Mr. Alexander Agassiz, Mr. J. A. Allen, and others. There are sad blanks in these lists; names of young men who would, no doubt, have been life-long friends and efficient co-workers in the Institution. Such were Bowditch and Shurtleff, promising students who left their scientific work for a higher duty, and died in the war; and since then, Dr. Wheatland and the younger Horace Mann, two of its most valuable assistants, have also passed away.

These were all men trained as special students; but Professor Agassiz has constantly had in view a more general educational scheme. With this aim he has amassed duplicate specimens from every branch of the animal kingdom in such numbers as would enable him not only to enter upon the largest system of exchanges with all existing museums, but to make distinct systematic collections for the purpose of teaching, and prepare for the use of young and inexperienced students a series of specimens such as even well-trained and competent naturalists would be glad to obtain for study. It is to this wealth of material, not to be found even in the first museums of Europe, that he looks as affording the means of ever-increasing usefulness to the Institution. Up to the present year, while a certain number of students have always been trained in the laboratories, and lectures on Geology, Zoölogy, and Palæontology, with free attendance for all, have been constantly given in the lecture-room of the Museum, it has been difficult to organize large classes of students for private instruction on account of the want of room. Notwithstanding this difficulty, which still remains as great as ever, by a certain ingenuity in the arrangements, and by sacrificing a large part of the lecture-room, space has been cleared this year for

the accommodation of a number of students from the University who have elected Natural History as their favorite study. The general plan of instruction for these classes has been organized by Professor Shaler, who has undertaken the entire charge of this department. There are now between forty and fifty students working in the Museum, most of them under his direction. In consideration of this more direct co-operation with the University, the Corporation of Harvard College has assumed the larger portion of the salary of Mr. Shaler, and has also provided an assistant teacher, Mr. Tuttle, who gives lessons to the same classes in the use of the microscope. The plan of Mr. Shaler is one in harmony with the whole spirit of instruction already established in the Institution; namely, that of excluding text-books, which, as a general thing, lead to the indolence of teachers and the intellectual extinction of scholars, and substituting for them the objects themselves; making the specimen in the student's hand his teacher, assisting him only with such oral instruction and explanation as may be necessary to prevent him from becoming discouraged in his task. By this method the pupil learns from nature and not from books, and his acquirements are the result of observation, not merely an effort of memory. The teacher is also stimulated by the questions constantly suggested or asked, and is kept up to the progress of investigation, while text-books are constantly falling behind the actual state of scientific knowledge.

It may be asked of what use these studies are to men not intending to be professional naturalists. The answer in detail would be a long one, and would show that there are more points of contact between science and commerce and professional pursuits than is generally supposed. But without reference to what is called the practical side of the question, a knowledge of the structure of the earth on which he lives, of the beings by which he is surrounded, of the thousand processes by which Nature works in her hidden laboratories, is of use to any intelligent, thoughtful man. It may be added that the mental training through which the naturalist passes will do good service in any department of life. The methods of study by which nicety of discrimination, readiness of comparison, power of detecting and classifying resemblances and differences are obtained, are of universal application. The man who has had these faculties fairly developed will never think that the time he spent in acquiring them was lost or ill applied.

The Museum is thus daily, both by securing for itself a place among the recognized centres of scientific research and, by associating itself with the immediate practical interests of education, making good its

claim upon the State. It is sincerely to be hoped that the strong interest which has already been shown by the Legislature of Massachusetts and our own citizens will not flag, and that sufficient aid will be given to carry out and fully complete this admirable work within the lifetime of the distinguished man who has done so much to elevate the tone of thought, and improve the method of education in this, his adopted country.

PRESENT CONDITION OF THE BUILDING.

The plans appended to this general statement will show the present state of the Museum building. The appropriation of the Legislature of the two past years has been devoted to enlarging the edifice. The Director had thought that with this sum the north wing might be finished, this being all he has ever hoped to see completed during his own lifetime; but the means have proved insufficient, and the utmost that could be done (the whole building having been originally planned in sections so as to provide for its increase) was to add two fifths of the north wing to the two fifths already standing, leaving the final fifth to be added at some future time. Even for this partial success the Museum is greatly indebted to Mr. John H. Thorndike, who by his advice and supervision as to the mode of building, and the making of contracts, etc., has rendered it possible to complete this addition with all the economy consistent with solidity and thoroughness. His services have been freely given and have been invaluable. We are further indebted to Mr. R. H. Slack for his faithful supervision of the work, and for the plans which accompany this pamphlet. It is but justice to add that the manner in which Mr. Ebenezer Johnson is carrying out his contract for the building is highly satisfactory. It now becomes a question of great anxiety to the Director and to all the friends of the Institution how the means are to be provided for the most complete and useful exhibition and arrangement of the collections in the new building. As it is, but a small part of them can be fairly presented; and even this partial execution of the plan calls for an expenditure which will drain the permanent resources of the Institution.

We have thus presented the difficulties of the case, trusting that the Legislature will take them into consideration, since they are entailed upon the Museum by the very success which entitles it to their continued care.

APPENDIX.

PRINCIPAL DONATIONS, IN MONEY, TO THE MUSEUM OF COMPARATIVE ZOÖLOGY.

Allen, Freeman, subscription of 1859		$ 100.00
Amory, Chas., „ „		100.00
Amory, Wm., „ „	$ 200.00	
„ „ 1st subscription	500.00	
„ „ 2d „	500.00	
		1,200.00
Andrews, Wm. T., subscription of 1859		1,000.00
Appleton, Nathan, „ „		2,000.00
Appleton, Saml. A., „ „		500.00
Appleton, Wm., „ „		1,000.00
Bacon, D. G. and W. B., „ „		150.00
Bacon, Francis, „ „		100.00
Barnard, James M., „ „	1,000.00	
„ „ „ collection	100.00	
„ „ „ arranging collections	500.00	
„ „ „ 1st subscription	1,000 00	
„ „ „ 2d „	1,000.00	
		3,600.00
Bates, Benjamin E., 2d subscription		1,000.00
Bartlett, Sidney, „ „		500.00
Beale, J. H., subscription of 1859		100.00
Bigelow, G. T., „ „	100.00	
„ „ „ 1st subscription	300.00	
		400.00
Bigelow, Jacob, subscription of 1859		1,000.00
Blake, George Baty, „ „		100.00
„ „ „ ($ 500). See Humboldt Scholarship.		
Blanchard, J. A., subscription of 1859		50.00
Boardman, B. G., „ „		500.00
Bradlee, James Bowdoin, „ „		100.00
Bradlee, Josiah, „ „		1,000.00
Brewer, G., „ „	1,000.00	
„ „ 1st subscription	1,000.00	
		2,000.00
Brimmer, M., subscription of 1859	1,000.00	
„ „ 2d subscription	1,000.00	
„ „ 3d „	1,000.00	
		3,000.00
Brimmer, Miss, subscription of 1859		1,000.00
Brooks, P. C., „ „		500.00
Brooks, Peter C., Jr., „ „		1,000 00
Brooks, S., 1st subscription		500.00
Amount carried forward		$ 22,500.00

	Amount brought forward	$22,500.00
Bullard, Wm. S.,		500.00
Cabot, Henry, subscription of 1859		100.00
Callender, George, „ „		100.00
Cary, Thomas G., „ „	1,000.00	
„ „ „ donation	300,00	
		1,300.00
Chadbourne, Prof. P A., donation		100.00
Coolidge, T. J., 1st subscription		250.00
Crocker, Uriah, subscription of 1859		50.00
Cushing. John P., „ „		2,000.00
Dana, Farrar, & Hyde, „ „		150.00
Davis, J. Amory, „ „		100.00
Davis, James, donation, 1864		250.00
Davis, James, Jr., subscription of 1859		200.00
Denny, Daniel, „ „		100.00
Durant, H. F., „ „		100.00
Edmands, J. W., „ „		100.00
Endicott, Mr., donation, 1861		32 00
Evans, Wm., subscription of 1859		100.00
Everett, Edward, „ „		200.00
Fay, R. S., Jr., „ „		100.00
Fishers and Chapin „ „		100.00
Fletcher, Richard „ „		100.00
Forbes, J. M., „ „		2,000.00
Forbes, Mrs. J. M., 1st subscription	500.00	
„ „ „ 2d „	500 00	
		1,000.00
French, Jonathan, subscription of 1859		100.00
Frothingham, N. L., „ „		100 00
Gardner, John L., „ „		500.00
Goodwin, Ozias, „ „		500.00
Gorham, J. L., „ „		150.00
Grant, Moses, „ „		50.00
Gray, Francis C., bequest		50,000.00
Gray, John C., subscription of 1859		1,000.00
Greene, B. D., „ „		300.00
Greene, Miss Sara, „ „		500.00
Greenough, W. W., and others, donations, 1861		1,850.00
Grew, Henry, subscription of 1859		300.00
Guild, James, „ „		100.00
Harvard College, Land for Museum valued in 1859 at about	18,000 00	
„ „ for support of collections, before 1861	8,130.00	
„ „ balance of Professor Agassiz's collection in 1853, — see Thomas H. Perkins and others	1,825.00	
		27,955.00
Haven, Franklin, subscription of 1859		500.00
	Amount carried forward	$115,437.00

	Amount brought forward	$115,437.00
Hall, A. T., subscription of 1859		50.00
Hardy, Alpheus, „ „		100.00
Heard, J. T., „ „		100.00
Heard, J Theo., „ „		100.00
Hemenway, Aug., „ „		1,000.00
Hemenway, Mrs. Aug., 1st subscription	2,000.00	
„ „ „ 2d „	1,000.00	
„ „ „ 3d „	1,000.00	
„ „ „ a collection of Insects	2,300.00	
		6,300.00
Hooper, N., subscription of 1859		100.00

Humboldt Fund, raised by the Boston Society of Natural History, at the Centennial Celebration.

SUBSCRIBERS.

Geo. Baty Blake,	Wm. Claflin,
Jas. M. Barnard,	Geo. Ticknor,
Gardner Brewer,	W. E. Baker,
Geo. C. Richardson,	Geo. C. Lord,
Jas. L. Little,	Eben D. Jordan,
N. Paine,	Eliza S. Quincy,
Robert W. Hooper,	Geo B. Hyde,
Wm. Munroe,	H. W. Williams,
M. P. Wilder,	Eben Dale,
Jacob Bigelow,	Theron J. Dale,
Jos. S. Ropes,	Alex. H. Rice,
S. Powell,	W. D. Pickman,
J. F. Hunnewell,	Charles Deane,
H. P. Kidder,	N. B. Shurtleff,
Wm. Endicott, Jr.,	J. M. Manning,
W. R. Robeson,	Geo. W. Gibbs,
E. F. Shaw,	Geo. W. Warren,
John Bacon,	Geo. W. Wales,
John A. Lowell,	F. M. Johnson,
J. C. Hoadley,	L. B. Harrington,
C. M. Warren,	D. N. Skillings,
J. H. Thorndike,	E. B. Phillips,
T. Gaffield,	Fogg, Houghton, & Coolidge,
G. H. Kuhn,	John B. Alley,
S. R. Urbino,	Warren Sawyer,
John Gardner,	Joseph Souther,
Mrs. J. E. Lodge,	Webster & Co.,
W. T. Andrews,	F. S. Merritt,
R. C. Waterston,	E. J. Young,
G. B. Emerson,	Geo. Lawton,
Stephen Salisbury,	J. B. Bright,
Mrs. G. H. Shaw,	J. J. May,
H. B. Rogers,	E. B. Bigelow,
W. B. Spooner,	Amos A. Lawrence,
E. R. Mudge,	Abbott Lawrence,
S. Hooker,	Hon. Wm. Greene,
Ben. S. Rotch,	R. B. Forbes,
Francis Dana,	C. L. Flint.

These subscriptions, with the proceeds of Professor Agassiz's Address, made the sum of	7,040.00
Amount carried forward	$130,227.00

	Amount brought forward	$130,227.00
Hooper, S., subscription of 1859	2,000.00	
„ „ 2d subscription	1,000.00	
„ „ 3d „	1,000.00	
		4,000 00
Hovey, George O., subscription of 1859		200.00
Howe, J. C., „ „		200.00
Hunnewell, H. H., 2d subscription		1,000.00
Inches, Misses, 2d subscription		300.00
Jewell, Harvey, donation for a library, 1861		300.00
King, Edward, (N. Y.,) subscription of 1859		25.00
Kuhn, G. Harvey, „ „		100.00
Larkin, Stackpole, & Co., „ „		100.00
Lawrence, Abbott, „ „	2,000.00	
„ „ donation, 1864	500.00	
		2,500.00
Lawrence, A. A., subscription of 1859		1,000.00
Lawrence, Abbott, Jr., 2d subscription		1,000.00
Lawrence, James, subscription of 1859	1,000.00	
„ „ 1st subscription	2,000.00	
„ „ 3d „	1,000.00	
		4,000.00
Lawrence, Mrs. Abbott, subscription of 1859		2,000.00
Lee, Henry, „ „		100.00
Lee, Henry, Jr., „ „		100.00
Lincoln, Ezra, „ „		100.00
Little, James L., 2d subscription	1,000.00	
„ „ „ 3d „	1,000.00	
		2,000.00
Lodge, Dr. G. H., subscription of 1859		100.00
Lodge, Mrs. J. E., donation	1,000.00	
„ „ „ 2d subscription	1,000.00	
		2,000.00
Lombard, Israel, subscription of 1859		100 00
Loring, Charles G., „ „		100.00
Loring, Miss Abby M., „ „		500.00
Loring, Mrs. Elijah, „ „		500.00
Lyman, G. W., and others, for alcohol		150.00
Lyman, Theodore, subscription of 1859	2,000.00	
„ „ for salaries	6,000 00	
„ „ for casts	100.00	
„ „ for alcohol	160.00	
„ „ 1st subscription	2,000 00	
„ „ 2d „	1,000.00	
„ „ 3d „	2,000.00	
		13,260.00
	Amount carried forward	$165,962.00

	Amount brought forward	$165,962.00
Lowell, John A., 1st subscription	2,000.00	
„ „ „ 2d „	2,000.00	
„ „ „ 3d „	1,000.00	
		5,000.00
Mason, Wm. P., subscription of 1859		1,000.00
Massachusetts, State of, Grant from sales of State Lands, 1860	100,000.00	
„ „ „ Grant for Collections,	20,000.00	
„ „ „ Catalogue Fund,	10,000.00	
„ „ „ 1868, Grant	10,000 00	
„ „ „ 1869, 1st Conditional Grant	25,000 00	
„ „ „ 1870, 2d „ „	25.000.00	
		190,000.00
Matthews N., 1st subscription	750.00	
„ „ 2d „	250 00	
		1,000.00
May, John J., subscription of 1859		100.00
May, Saml., „ „		50 00
Milton, Wm. H., „ „		50.00
Minot, G. R., „ „		100.00
Minot, Wm., „ „		100.00
Mudge, E. R., 2d subscription		1,000 00
"N. N." by Jas. Lawrence, subscription of 1859		300.00
N. N., „ „		50.00

SUBSCRIBERS FOR THE PURCHASE OF PROFESSOR AGASSIZ'S COLLECTION OF NATURAL HISTORY, IN 1853. See *Harvard College.*

Thomas H. Perkins,	S. Hooper,
Jonathan Phillips,	Wm. T. Andrews,
Samuel Appleton,	J. Davis, Jr.,
J P. Cushing,	Enoch Train,
Robert G. Shaw,	Geo. B. Upton,
Jno. Eliot Thayer,	P. C. Brooks,
Geo. C. Shattuck,	Franklin Haven,
Wm Sturgis,	W. H. Prescott,
T. W. Ward,	J. W. Trull,
Nathan Appleton,	Edward Austin,
Charles G. Loring,	John D. Bates,
Edward Everett,	Henry Cabot,
John L. Gardner,	J M. Forbes,
W. W. Boardman,	J. J. Dixwell,
Thomas Lee,	Benj. D. Greene,
Thomas B. Curtis,	Fr. Skinner,
Francis C. Lowell,	Wm F. Weld,
W. S Bullard,	B. B. Muzzey,
A. Heard,	Chas. C. Little,
N. Thayer,	Jared Sparks,
Ozias Goodwin,	Paschal P. Pope,
A. Hemenway,	Wm. Rodman,
Francis Peabody,	Wm. Sawyer,
W. D. Pickman,	A. A. Lawrence,
M. Brimmer,	A. T. Hall.

10,175.00

Amount carried forward	$374,887.00

	Amount brought forward	$374,887.00
Parker, H., subscription of 1859		50.00
Parker, James, „ „		200.00
Parkman, G. F., „ „	500 00	
„ „ „ 2d subscription	500.00	
		1,000.00
Perkins, William, subscription of 1859		100.00
Peters, G. H., „ „		50 00
Phillips, Jonathan, „ „		2,000.00
Pickman, W. D., 2d subscription		500.00
Pierce, T. W., subscription of 1859		100.00
Pope, Paschal P., „ „		500,00
Pratt, Miss Mary, „ „		1,000.00
Pratt, Miss Sarah P., „ „		1,000.00
Prescott and Chapin, „ „		50 00
Quincy, Josiah, „ „		500.00
Reed, Alfred A., „ „		200.00
Richardson, George C., 2d subscription		1,000.00
Richardson, Jeffrey, subscription of 1859		500.00
Rogers, H. B., „ „		1,000.00
Russell, George R., „ „		200 00
Russell, Mrs. G. R., donation, 1864	3,000 00	
„ „ „ „ 1st subscription	200.00	
„ „ „ „ 2d “	500 00	
		3,700.00
Salisbury, Stephen, subscription of 1859		1,000.00
Sanders, Charles, „ „		1,000 00
Sargent, Geo. B., „ „		500.00
Sayles, Mrs. M. F., „ „		1,000 00
Sears, David, „ „		1,000.00
Shaler, Professor N. S., for a collection		100.00
Shaw, G. H., subscription of 1859		1,000.00
Shaw, Mrs. G. H., „ „	500 00	
„ „ „ „ 1st subscription	2,000.00	
„ „ „ „ 2d „	1,000 00	
„ „ „ „ 3d „	2,000.00	
		5,500.00
Shaw, Miss M. L., 2d subscription		200.00
Shaw, Mrs. R. G., subscription of 1859	300.00	
„ „ „ „ 2d subscription	500.00	
		800.00
Shaw, Q. A., donation, 1861		1,000.00
Shimmin, C. F., subscription of 1859		50.00
Shimmin, Thos., „ „		50.00
Simmons, John, „ „		100.00
Skinner, F., „ „		500.00
Stearns, John, Jr., „ „		100 00
	Amount carried forward	$402,437.00

		Amount brought forward	$402,437.00
Sturgis, Henry P.,	subscription of 1859		200.00
Sturgis, Wm.,	„ „		2,000.00
Swift, Wm. H.,	„ „		100.00
Thayer, Nathaniel,	„ „	5,000.00	
„ „	Thayer Expedition to Brazil, in 1865	22,652.00	
„ „	Advanced for arranging the collection	4,157.00	
„ „	For salaries and support of students from 1865 to 1870	7,489.00	
„ „	1st subscription	10,000.00	
„ „	2d „	5,000.00	
„ „	3d „	5,000.00	
			59,298.00
Thompson, Newell A.,	subscription of 1859		100.00
Thwing, S. C.,	„ „		100.00
Ticknor, George,	„ „		1,000.00
Timmins, Henry,	„ „		200.00
Trull, J. W.,	„ „		200.00
Tucker, W. W.,	„ „		100.00
Wales, Miss Mary Ann,	„ „		100.00
Wales, Mrs. Abby L.,	„ „		100.00
Wales, Thos. B.,	„ „		500.00
Ward, Saml. G.,	„ „		1,000.00
Ware, John,	„ „		50.00
Warren, C. M., (N. Y.)	„ „		500.00
Waterston, Robert,	„ „		100.00
Whitney, H. A.,	2d subscription		100.00
Whitney, Joseph,	subscription of 1859		500 00
Wigglesworth, Edward,	„ „		3.0000
Wigglesworth, Thomas,	„ „		100.00
Wigglesworth, Miss M.,	„ „	500.00	
„ „ A.,	„ „	500.00	
„	Misses, 2d subscription	500.00	
			1,500.00
Weld, Wm. F.,	subscription of 1859		1,000.00
Williams, D. W.,	„ „		100.00
Williams, Moses,	„ „		1,000.00
Winchester, E. A. and W.,	subscription of 1859		500.00
Winthrop, Robert C.,	„ „		150.00
Wolcott, J. H.,	„ „	200.00	
„ „ „	2d subscription	300.00	
			500.00
Woodman, H.,	subscription of 1859		100.00
		Total	$473,935.00

Over four hundred and seventy-three thousand dollars may seem a large sum for a Museum of Natural History. But when it is remem-

bered that such institutions are the standards by which the intellectual culture of a nation is measured, and that it is more difficult to raise such standards than even to increase the general wealth of the community, our total will appear small in comparison with the means employed to make money. What do our enterprising merchants think of a mill or a factory costing half a million of dollars or more? They multiply them all over the country beyond our ability to count them. Is it, then, too much to expect that one great Museum may be erected among us capable of containing a suitable representation of all the objects necessary for a correct appreciation of the plan of Creation — even if it should cost millions? May we not hope that when the nation celebrates the centennial anniversary of American Independence, such a Museum may be numbered among the recent achievements of the Republic?

EXPLANATION OF THE PLATES.

Pl. I. — Façade of the north wing. The lower row of windows belongs to the basement; the second and third row to the first story and its gallery; the fourth and fifth row to the second story and its gallery; the upper row and the skylights to the attic.

Pl. II. — Represents the basement, which is devoted to the storing of duplicates and apparatus and to the temporary arrangement of such alcoholic collections as cannot, for the present, be put up in the exhibition-rooms.

Pl. III. — Plan of the first story. Devoted to the synthetic room, containing a summary exhibition of the whole animal kingdom; with work-rooms to the east and exhibition-rooms to the west, containing the domesticated animals and the collection of characteristic fossils.

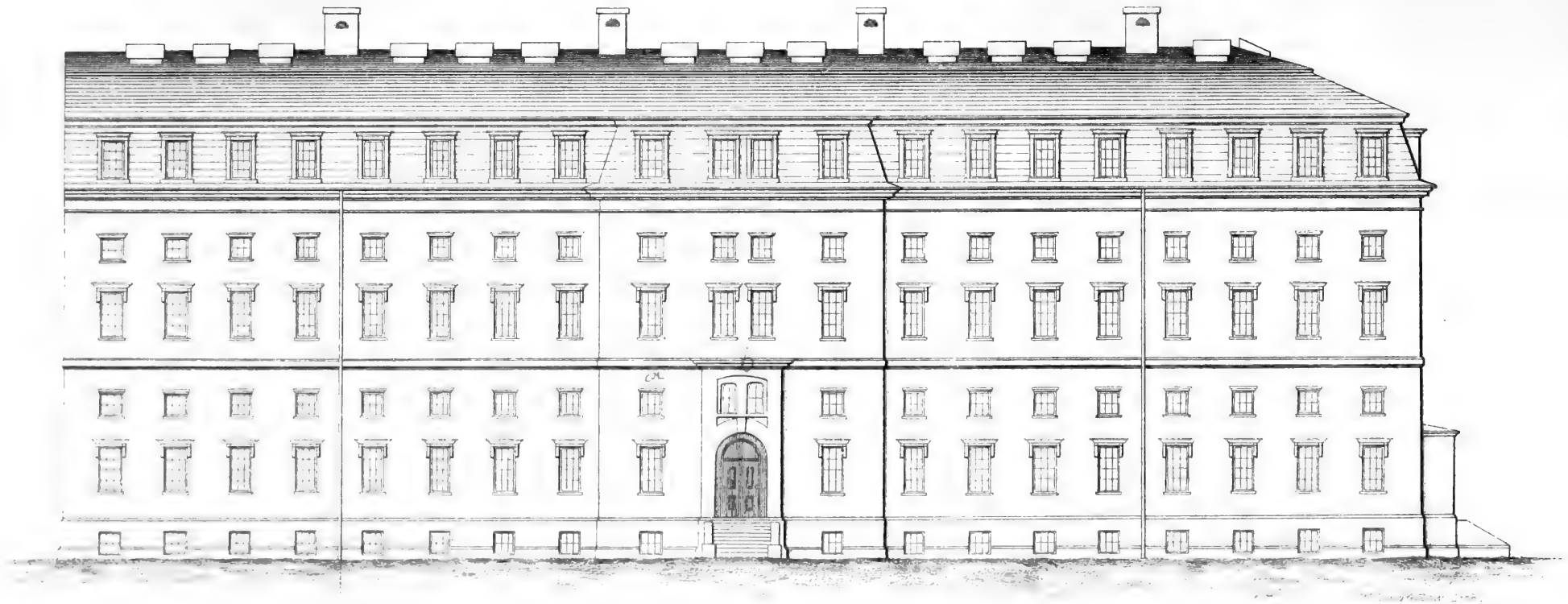
Pl. IV. — Plan of the second story. The great central hall is devoted to a systematic exhibition of the Vertebrates, while the rooms to the east contain the Articulates, Mollusks, and Radiates, and the rooms to the west the faunæ of North and South America and of Europe.

Pl. V. — Plan of the attic. The central room contains the large skeletons, whales, &c.; the rooms to the east are laboratories, with the library, the photographic apparatus, and the microscope room. On the west side are the fossil plants, with the collection of palms and tree-ferns, etc.

The dotted lines on Pl. II, III, IV, and V represent parts of the north wing not yet built.

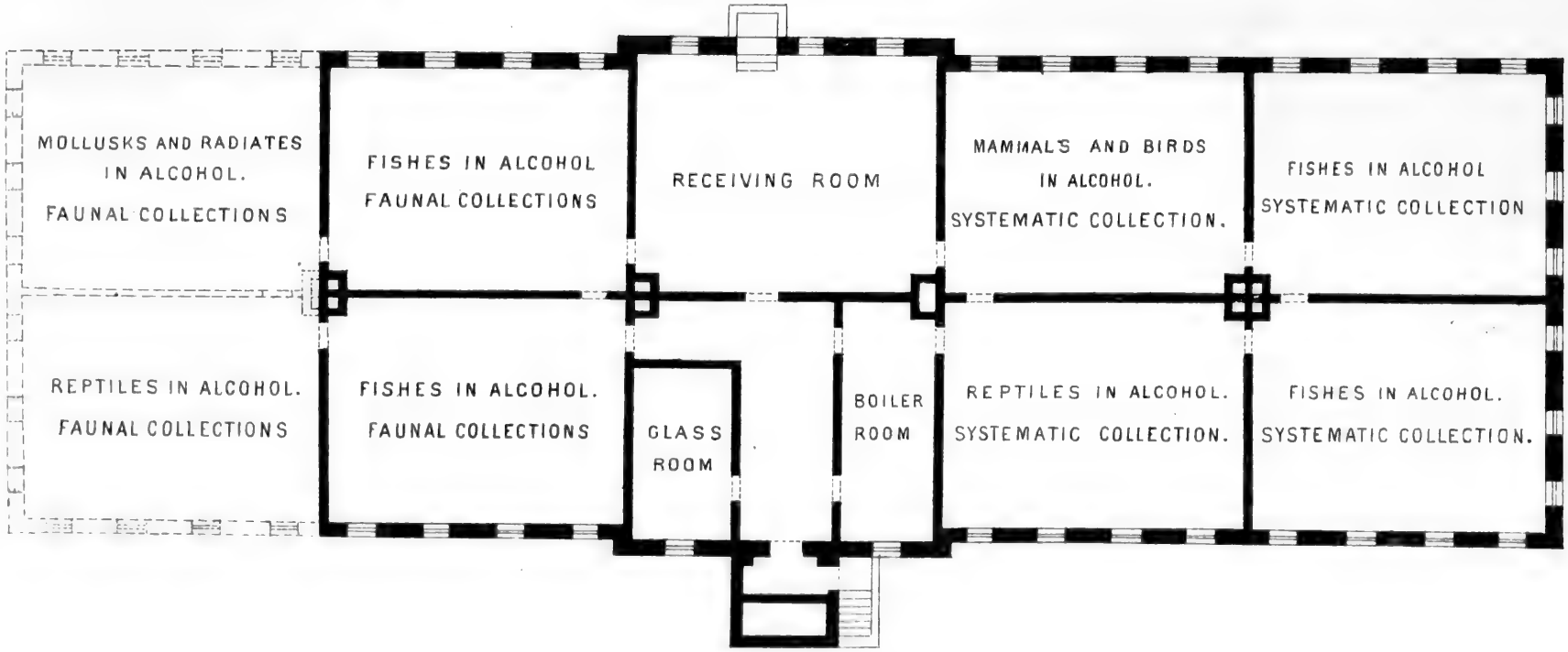
Rooms are still wanting for the faunal collections of the Arctics, and of Asia, Africa, and Australia, and for the faunæ of the primordial, secondary, and tertiary geological periods.

MUSEUM OF COMPARATIVE ZOOLOGY, CAMBRIDGE, MASS.

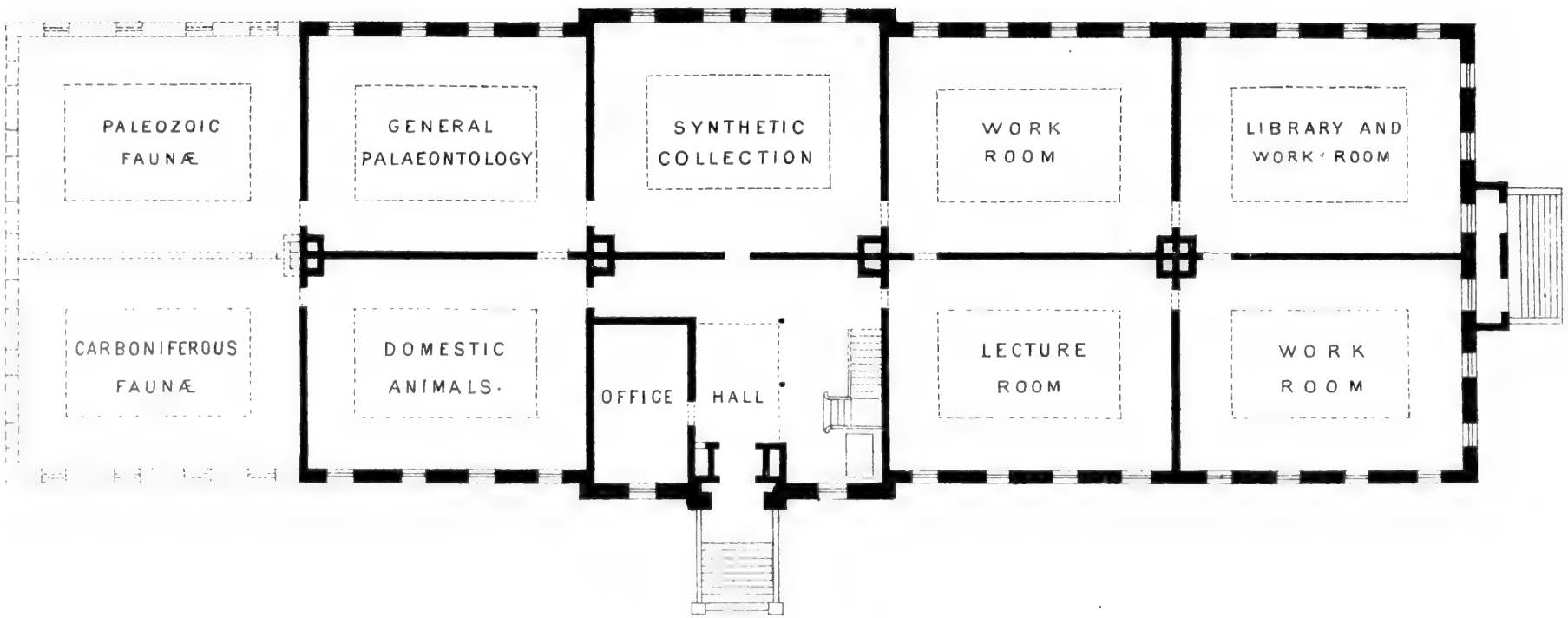


FRONT ELEVATION

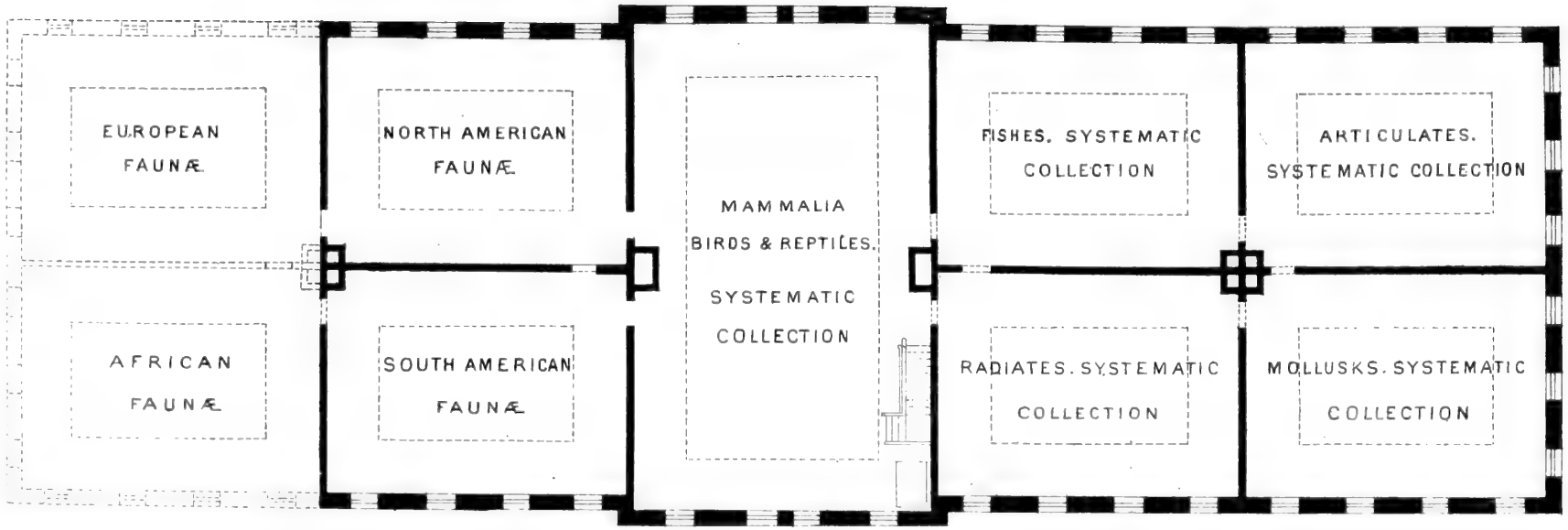
OF THE NORTHERN WING.


MOLLUSKS AND RADIATES IN ALCOHOL. FAUNAL COLLECTIONS
FISHES IN ALCOHOL FAUNAL COLLECTIONS
RECEIVING ROOM
MAMMALS AND BIRDS IN ALCOHOL. SYSTEMATIC COLLECTION.
FISHES IN ALCOHOL SYSTEMATIC COLLECTION
REPTILES IN ALCOHOL. FAUNAL COLLECTIONS
FISHES IN ALCOHOL. FAUNAL COLLECTIONS
GLASS ROOM
BOILER ROOM
REPTILES IN ALCOHOL. SYSTEMATIC COLLECTION.
FISHES IN ALCOHOL. SYSTEMATIC COLLECTION.

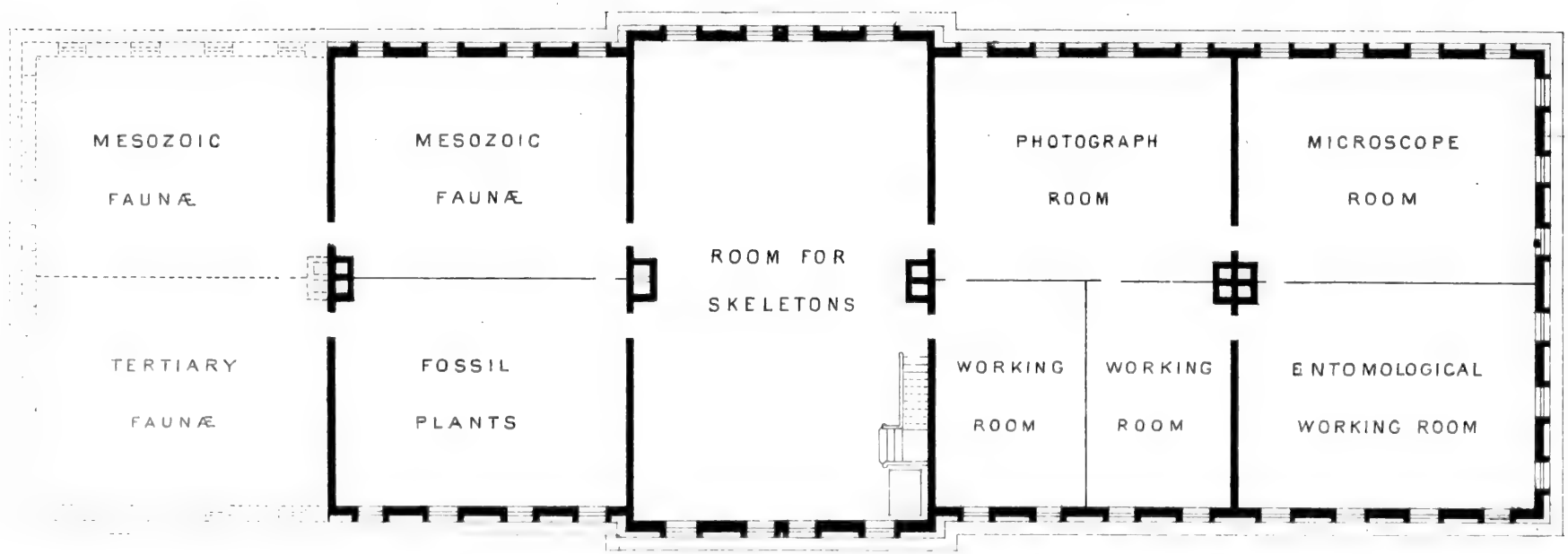
BASEMENT


PALEOZOIC FAUNÆ
GENERAL PALAEONTOLOGY
SYNTHETIC COLLECTION
WORK ROOM
LIBRARY AND WORK-ROOM
CARBONIFEROUS FAUNÆ
DOMESTIC ANIMALS.
OFFICE
HALL
LECTURE ROOM
WORK ROOM

FIRST STORY



SECOND STORY


MESOZOIC
FAUNÆ
MESOZOIC
FAUNÆ
ROOM FOR
SKELETONS
PHOTOGRAPH
ROOM
MICROSCOPE
ROOM
TERTIARY
FAUNÆ
FOSSIL
PLANTS
WORKING
ROOM
WORKING
ROOM
ENTOMOLOGICAL
WORKING ROOM

ATTIC STORY